INSTRUCTION MANUAL

TCS-950
Television Camera System

FAIRCHILD

SPACE AND DEFENSE SYSTEMS

A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

MP MASTER

MA30042

FOREWORD

This instruction manual provides preliminary operation and maintenance instructions for the TCS-950 Television Camera System.

The section index on the title page lists the major sections in numerical sequence. To locate a particular section, simply bend the book so as to "fan" the outer edges of the pages and open to the diagonal line tab corresponding to the section desired. Pages and illustrations in this manual are numbered sequentially by section.

If more detailed information is required on the operation and maintenance of the TCS-950 Television Camera System, please contact:

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FAIRCHILD

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INSTRUCTION MANUAL FOR TCS-950 TELEVISION CAMERA SYSTEM

Prepared By

COMMERCIAL

TELEVISION SYSTEMS

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SPACE AND DEFENSE SYSTEMS
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

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TCS-950 TELEVISION CAMERA SYSTEM

1.0 SYSTEM DESCRIPTION

The TCS-950 is a high quality, multi-frequency, high resolution two-piece television camera consisting of a cylindrical camera head, and a rectangular shaped camera control unit. The camera head and the camera control unit can be mounted separately, as they are shown on the opposite page, or together, as they appear on the cover of this manual. With the exception of the vidicon tube, the camera and camera control are fully transistorized, no tubes or nuvistors are used in either of the units. This system is designed to operate as a complete television pick-up system by observing a scene and producing a composite video output television signal. The signal is applied to a television picture monitor for viewing.

The TCS-950 is capable of operation from EIA standard rates of 525 lines per frame/ 30 frames per second/60 fields per second/interlaced 2:1 to 1225 lines per frame/ 30 frames per second/60 fields per second/interlaced 2:1.

All circuit components, including the video preamplifiers, are solid state with ninety-five per cent of the semiconductors utilized being silicon. For remote operation of the camera head, frequency compensation for cable lengths up to 1000 feet at all scan rates is provided; delay compensation for cable lengths up to 1000 feet at all rates is also available.

The TCS-950 Television Camera System is a small light weight unit, the camera head weighing 5 pounds 4 ounces, and the camera control weighing 16 pounds 4 ounces. Four camera control units may be mounted on a single 7-inch by 19-inch panel.

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2.0 SPECIFICATIONS

OPTICAL

Light level recommended	2 foot candles on vidicon faceplate
Light level for useable picture	0.5 foot candles on vidicon faceplate
Lens mount	16 mm C Mount
Scene aspect ratio, height to width	4:3 or 1:1
Color response	Approximates the human eye
Illumination Range	Target voltage adjusts automatically; range up to 1000:1

ELECTRICAL

Input power	115V, ±10%, 60 cycles, ±2 cycles 55 watts, without integral Sync Generator; 60 watts with integral Sync Generator
Fuse	1.5 Amp
Pick-up Tube	1-in. Vidicon 8483, 8484, 8485, 8507, 7735A, 7735B or 8573
Gray Scale Rendition	10 steps

Bandwidth	Processing amplifier bandwidth is flat within ±1 db to 24 mc; Solid state low-noise preamplifier is flat within ±1db to 24 mc and is non-microphonic
Low frequencies	Restored through utilization of keyed video clamp
Gamma Correction	Adjustable
Delay-Line Aperture Corrector	Provides continuously variable boost from 0 to 15 db
Scan Linearity	Within ±1% at all scan rates
Overscan	Minimum of 20% available at all scan rates
Vidicon Protection	Instantaneous beam cut-off in the event of failure of deflection in either axis
Horizontal Resolution	1000 TV lines (minimum) at center at all scan rates to 1029
Corner Horizontal Resolution	700 TV lines (minimum) in each corner at all scene rates (with 8485 or 8507 vidicon)
Vertical Resolution	700 lines (with 1029 line format)
Focus	Electromagnetic
Deflection	Electromagnetic
Alignment	Electromagnetic
Output Signal	Dual video outputs each provide 1.4 volts, black negative, source terminated, composite signal into 75 ohms Video outputs are short-circuit proof

Sync Generator	Full binary counter adjustable for 525, 625, 875, 945, and 1029 ratios; self-contained, utilizes silicon micrologic elements; may be operated integral to camera control or as a separate master unit; complete EIA Sync, blanking, and drive waveforms at all rates; frequency standard selectable for Xtal, free-run or locked to power line; camera system operates from any external EIA sync generator.
	Output Signals: 1. Negative composite sync, 4V, ±0.5V across a load impedance of 75 ohms. 2. Negative mixed blanking, 4V, ±0.5V across a load impedance of 75 ohms. 3. Negative vertical drive, 4V, ±0.5V across a load impedance of 75 ohms. 4. Negative horizontal drive, 4V, ±0.5V across a load impedance of 75 ohms.
Power Supply	All DC potentials regulated to 1% or better. Constant current supply for vidicon heater and focus coil. Automatic regulation of potentials in Camera Head, independent of cable length.
Audio Intercom	Facility provided between remote head and camera control.

REMOTE OPERATION OF CAMERA HEAD

Video Frequency Compensation	For cable lengths up to 1000 feet at all scanning rates
Delay Compensation (optional)	For cable lengths up to 1000 feet at all scanning rates

MECHANICAL

Physical Dimensions

Camera Head	2-3/4-in. x 13-in.
Camera Control Unit	14-1/4-in. x 6-1/2-in. x 3-1/4-in.

Weight

Camera Head	4 pounds
Camera Control Unit	13 pounds

Temperature

Continuous Operation (with normal performance)

Camera Head	-20°C to +55°C
Camera Control Unit	-20°C to +70°C

Continuous Operation (with reduced performance)

Camera Head	-20°C to +70°C
Camera Control Unit	-20°C to +70°C

3.0 INSTALLATION

CAUTION

Before installing the vidicon tube in Camera Unit, resistor, R4, located in the power supply chassis MUST be checked for proper value. See chart below:

Vidicon	Fil. Current	R4 In Power Supply	R4 Part No.
8483 or 8485	300 ma	15 Ohms 3W 1%	02660750
8484	600 ma	7.5 Ohms 5W 1%	01140000
8507	600 ma	7.5 Ohms 5W 1%	01140000
7735A or 7735B	600 ma	7.5 Ohms 5W 1%	01140000

R4 in power supply must be in accordance with this chart; an incorrect R4 value can result in vidicon filament damage.

For proper Camera-to-Control cable length:

Tl-TAP	For Use With Cable Lgt
11-12	0-333 Ft
10-12	333-666 Ft
9-12	666-1000 Ft

3.1 INSTALLATION OF VIDICON TUBE

The following installation procedures should be used when installing and/or replacing the vidicon tube.

1. Remove the 4 binder head screws from the front, and 2 screws from each side of the camera cover and slide cover off camera head.

2. Remove the focussing ring from the camera head by unscrewing the ring counterclockwise.

3. Unscrew and remove the shield from the front pre-amplifier.

4. Determine whether the rear tube clamp (located in front of the rear pre-amplifier) is loose enough to enable the vidicon to pass through.

5. Disconnect the vidicon socket.

6. Remove the new vidicon from its packing case.

CAUTION

Exercise care when handling the vidicon tube. To prevent breakage and/or injury from flying glass, do not employ force at any time.

7. Slide the vidicon through the opening in front of the camera.

8. Rotate the vidicon so that the short index pin in the base is aligned with the key of the socket. Place the socket on the vidicon pins (while holding your fingers on the tube's faceplate to maintain its position) as you push the socket onto the tube's pins.

9. Clean the vidicon's faceplate with a lens tissue.

10. After positioning the vidicon tube, proceed to replace the Lucite vidicon clamp threading it clockwise. Do NOT thread the clamp threads flush. Leave about three threads exposed.

11. Move the vidicon so the faceplate seats flush against the vidicon clamp; then, tighten the rear clamp.

12. Replace the "C" mount by screwing clockwise.

13. Replace the 4 binder head screws in front and 2 screws on each side of the camera cover.

14. Install the lens by screwing the lens clockwise into the "C" mount in front of the camera.

///////

4.0 OPERATION

4.1 FRONT PANEL OPERATING CONTROLS

Camera Control	The camera control should be put into operation in accordance with the "Operating Instructions" in this manual. These instructions are written for the benefit of non-technical operating personnel.
Power Switch	Turns camera and camera control units "ON-OFF"
Target Control	Sets vidicon target voltage
Beam Control	Adjusts vidicon tube beam current
Focus Control	Adjusts voltage potential at vidicon tube focus electrode

4.2 CAMERA OPERATING INSTRUCTIONS

IMPORTANT: Follow These Instructions Carefully!

1. Turn the beam control and the target control of the Camera Control unit fully counterclockwise.

2. Verify that the TCS-950 power cord is plugged into a 117 VAC line.

3. Verify that the video monitor is plugged into the 117 VAC line.

4. Verify that the camera head and camera control unit are connected together with the TV cable.

5. Verify that the monitor and camera control unit are connected together with a length of coaxial cable. The monitor must be terminated (75 ohms).

6. Turn the video monitor on, rotate the contrast or gain control to mid-position.

7. Turn the toggle switch of the camera control unit to the ON position. A red indicating lamp will light.

8. Observe the monitor to establish that the raster is synchronized. If it is not, adjust either the horizontal or the vertical hold, or both, to obtain synchronization.

9. If the raster is synchronized, turn the target control to the full clockwise position.

10. Increase the beam current by turning the Beam Control clockwise, until the picture appears.

11. Focussing - Positioning the electrical focus control knob at the center of its range. Adjust the optical focus on the camera unit by rotating the lens focussing ring until the picture is in focus.

12. After obtaining the best available optical focus, adjust the electrical focus control knob of the camera control unit to obtain a clear, sharp picture.

13. After completing steps 11 and 12, it may be necessary to rotate the lens focussing ring again to obtain the clearest, sharpest picture possible.

4.3 INTERNAL ADJUSTMENTS

The Camera has been carefully adjusted during factory test and, normally, only the operating controls (electrical focus, beam, and target) will require resetting. If the instructions in the preceding paragraph (4.2) do not produce proper results, some of the following adjustments may be necessary.

4.3.1 Focus and Alignment Chassis

Alignment Switch	S1	Wobbles focus coil current to facilitate adjustment of alignment coil currents
Horizontal Blanking Width	R56	Controls vidicon blanking pulse width
Horizontal Centering	R16	Positions vidicon beam in horizontal axis
Horizontal Size	R24	Controls horizontal scanning amplitude
Delayed Horizontal	R83	Used to delay START of horizontal sweep
Blanking (Optional)	R91	Proper setting dependent on length of camera cable

→ See 4.4, Scanning Adjustments.

Vertical Centering	R33	Positions vidicon beam in vertical axis
Vertical Size	R27	Controls vertical scanning amplitude
Vertical Linearity	R32	Linearizes the vertical sawtooth waveform

→ See 4.4, Scanning Adjustments.

Align "A"	R19	Alignment coil current controls - set for minimum displacement of raster center with S1 in ON position
Align "B"	R22	

4.3.2 Camera Head

Horizontal Linearity	R22	Linearizes the horizontal sawtooth waveform
High Frequency Compensation	C35	Amplifier frequency response adjustment

4.3.3 Video Processor

Switch	S1	Gamma ON-OFF Switch
Video Level	R2	Adjusts amplifier level
Aperture Correction	R93 R43	Provides continuously variable aperture boost
Gamma Bias	R21	Adjusts for desired gamma correction
Termination Pot	R30	Adjusts for properly sending end impedance of delay line

→ See 4.5, Video Processor Adjustments.

Pedestal	R63	Adjusts pedestal level
Sync Amplifier	R80	Adjusts the composite sync amplitude
Coax line compensator	C2	Adjusts for camera head-to-camera control cable length
Frequency Compensation	C3	Frequency response adjustment
Aperture Peaking	C21	Frequency response adjustment
	C30	Frequency response adjustment

4.4 SCANNING ADJUSTMENTS

If changes in the size of the scanning raster are indicated, the adjustments should be made only if adequate means of checking linearity at the same time are available. A monitor that is known to be linear must be used. If such a monitor is not available, satisfactory adjustments can be made as follows: Connect the Camera to two or more monitors and observe the resulting linearity. If all the monitors show the same degree of non-linearity, it can be assumed that the camera is non-linear and correction can be made.

Scanning adjustments involve size, linearity, centering, and correct aspect ratio. Horizontal circuit adjustments operate independently of the vertical adjustments. All of the controls, with the exception of horizontal linearity, are located in the camera control unit.

HORIZONTAL ADJUSTMENT		VERTICAL ADJUSTMENT	
Function	Control	Function	Control
Size	R24	Size	R27
Centering	R16	Centering	R33
Linearity*	R22	Linearity	R32

* Located in Camera Head

NOTE: Horizontal blanking control R56 adjusts the blanking signal that is transmitted to the vidicon tube within the camera head. When R56 is adjusted through its extremes of range, it will be observed that at one extreme, video information will be lost on the left side of the raster; in the other extreme, smearing of the picture information will occur.

Proper adjustment of this control is achieved when no video information is lost on the left side of the picture. This control (R56) should be positioned to just beyond the point where loss of video information starts to occur.

4.5 VIDEO PROCESSOR ADJUSTMENTS

If the system video or sync output level is abnormal, or if the resolution is abnormal, the following adjustment should be checked and corrected, if necessary.

Should the video amplifier level require adjustment, set signal for 0.25V P/P at base of transistor Q_1, by adjustment video level control R2.

4.5.1 Gamma Bias Control Potentiometer

A standard EIA test chart should be used when adjusting for gamma correction, assuming the video level control (R2), and pedestal control (R63), are properly set. Adjust gamma bias control (R12) so that the first two steps of the gray scale on the test pattern are stretched in the negative direction. The stretching of the black portion of the signal can be readily observed by viewing the video output signal at horizontal rate on an oscilloscope at the video output terminal.

4.5.2 Aperture Correction

The aperture correction control is a dual potentiometer arrangement. Adjustment is made by properly setting R93 and R43 in the collector circuit. This adjustment is made to obtain a boost in video gain while keeping noise at a minimal value.

4.5.3 Termination Control

Adjustment of termination control (R30) permits transmission of the sending-end impedance of the delay line.

4.5.4 Coax Line Compensator

The compensating capacitor (C2) function is to boost the high frequency response to compensate for the loss due to the length of cable from the camera head to the camera control. This should be adjusted to obtain maximum resolution with minimum noise.

NOTE: Normally, for a short cable length, C2 is set at minimum capacity (full counter-clockwise position); however, for long

cable lengths, it may be necessary to turn C2 in a clockwise direction to achieve maximum resolution with the minimum noise content in the picture.

4.5.5 Frequency Compensator

Compensating capacitor, C3, is used to achieve a flat response in the first amplification stage. Aperture peaking capacitors (C21 and C30) permit frequency response adjustments for the differential amplifiers.

4.5.6 Pedestal Control

Set pedestal level for 0.1V peak-to-peak by adjusting pedestal control, R63.

4.5.7 Sync Amplifier Control

Set sync level for 0.4V peak-to-peak by adjusting sync control, R80.

4.5.8 Video Output

With the pedestal, and sync levels properly set, measure the video level with an oscilloscope. The video level should measure 1V; composite video should measure 1.5V, peak-to-peak.

4.6 SYNC GENERATOR ADJUSTMENTS

4.6.1 Master Oscillator Adjustments

Observe waveshape at TP1 with scope locked to vertical drive signal. Place S1 into free position. A 60-cycle, signal of approximately 1.5V P/P should be seen running free. Adjust R4 until this signal stops its free running movement. Place S1 into lock position. The signal should lock to vertical drive. Adjust R45 until the field reference notch, appearing in locked signal, is in the center of the signal.

5.0 MAINTENANCE

5.1 GENERAL

Systematic and logical troubleshooting can save valuable time, whereas, indiscriminate turning of adjustments or transistor changing can be very wasteful of time and produce a poor or temporary solution to a problem. Generally, if any one of the suggestions for curing a trouble, such as making an adjustment or changing a transistor does not produce results, return the control to its original setting or replace the original transistor and proceed to the next solution.

Included in this section is a chart containing resistance values for all transistors, a series of waveform shapes for pulse width adjustments, and a tabulation of settings for the Sync Generator Multivibrator.

The lenses and face of the vidicon tube should be kept free of dust, dirt, oily fingerprints and other smears. Be sure vidicon tube is firmly seated in its socket.

Make certain that all transistors are insulated from ground by means of the insulating sleeves placed over the transistors.

5.2 MICROLOGIC AND TRANSISTOR PRECAUTIONS

When replacing micrologic and transistors, it is recommended that only the exact replacement be used to assure proper operation.

Most micrologic elements can be replaced without any readjusting, except when replacing a micrologic in a multivibrator stage. Then, the multivibrator should be readjusted for its proper pulse width.

CAUTION

When replaceing transistors that are insulated from ground by means of insulating sleevings, make certain that the insulating sleeving is placed over the transistor case.

5.3 FUSE REPLACEMENT

The 117 VAC input is fused with a 1.0 amp fuse, F1. Do not replace this fuse with one having a higher rating.

5.4 RESISTANCE CHARTS

These charts show the resistance of all transistors. (See pages 5-3 to 5-8)

RESISTANCE CHARTS

5.4.1 Camera Head connected to Control Unit

Symbol	Type	COLLECTOR		BASE		EMITTER	
		-	+	-	+	-	+
Q1	DU2A	7K X 100	X 10,000	75K X 10,000	14K X 10,000	3.2K X 100	3.1K X 100
Q2	DU2A	8K X 100	15K X 100	130K X 100	1K X 100	0	0
Q3	DU4A	4.5K X 100	600 X 100	2.6K X 100	3.2K X 100	6K X 100	80 X 100
Q4	DU4A	2.6K X 100	3.2K X 100	820 X 100	4.5K X 100	0	0
Q5	DU4A	4.5K X 100	600 X 100	650 X 100	680 X 100	0	0
Q6	2N2528	6K X 100	80 X 100	2.8 X 1	4.6 X 1	0	0
Q7	DU4A	3.5K X 100	900 X 100	200 X 100	200 X 100	0	0
Q8	2N398						
Q11	2N779A	65K X 10,000	5K X 10,000	1.45K X 100	9K X 100	1.2K X 100	1.1K X 100
Q12	2N779A	14K X 100	22K X 100	15K X 100	12K X 100	65K X 10,000	7K X 10,000
Q13	DU2A	4.2K X 100	12K X 100	3.5K X 100	2.5K X 100	2.2K X 100	1.2K X 100
Q14	DU2A	3K X 100	6.5K X 100	2.2K X 100	1.2K X 100	220 X 100	220 X 100
Q15	DU14	5.8K X 100	2.2K X 100	4.5K X 100	1.6K X 100	300 X 100	300 X 100
Q16	DU14	3.5K X 100	3K X 100	5.5K X 100	2.4K X 100	850 X 100	850 X 100
Q17	DU2	2.4K X 100	3.6K X 100	2.2K X 100	1K X 100	130 X 100	130 X 100

RESISTANCE IN OHMS TO GROUND. K EQUALS THOUSANDS. M EQUALS MILLIONS.
Measurements made with Simpson Model 260 Multimeter.
Negative Indicator, Negative Ground
Positive Indicator, Positive Ground
Use scale multiplication factor prefixed by "X"

5.4.1.1 Resistance Chart Between Pins of J1

From	To	Ohms
23	24	Infinity
31	Grnd	(meter polarity)
2	Grnd	Infinity
3	Grnd	Infinity
3	4	
11	13	Zero
18	19	Zero
6	Grnd	
5	Grnd	
12	17	

5.4.1.2 Resistance Chart From Pins On V1 Vidicon Tube Socket

V1 Pin	To	Ohms
1	23	0
8	24	0
7	Q2, Collector	0
7	Grnd	Polarity
2	J1-2	1K
6	15	2.2K
6	Grnd	
5	14	1K
5	Grnd	
Target Ring	Grnd	
Target Ring	J1	-500M

5.4.2 Focus and Alignment Chassis

RESISTANCE TO GROUND

Symbol	Type	COLLECTOR -	COLLECTOR +	BASE -	BASE +	EMITTER -	EMITTER +
*Q1	DU4A	10K R x 10,000	10K R x 10,000	2K R x 100	2K R x 10,000	8K R x 10,000	8K R x 10,000
Q2	DU4A	18K R x 10,000	8K R x 10,000	680 Ohms R x 100	680 Ohms R x 100	1.8K R x 100	900 Ohms R x 100
Q3	DU4A	8K R x 10,000	8K R x 10,000	140 Ohms R x 100	140 Ohms R x 100	1.8K R x 100	900 Ohms R x 100
Q4	DU10A	430 Ohms R x 100	430 Ohms R x 100	18K R x 100	1.1K R x 100	1.25K R x 100	1.35K R x 100
Q5	DU6A	430 R x 100	430 R x 100	1.25K R x 100	1.35K R x 100	2.6K R x 100	600 Ohms R x 100
Q6	DU4A	900 Ohms X 100	32K X 10,000	900 Ohms X 100	32K X 10,000	X100 800 Ohms	X100 800 Ohms
Q7	DU4A	600 Ohms X 100	42K X1	900 Ohms X 100	32K X 10,000	8K X 100	2.8K X 100
Q8	S3086	60 Ohms R x 100	2 Meg R x 100	8K R x 10,000	500 Ohms X 10,000	50 Ohms X 100	50 Ohms X 100
Q9	DU4A	60 Ohms X 100	60 Ohms X 100	8.5K X 100	5.5K X 100	50 Ohms X 100	50 Ohms X 100
Q10	DU4A	0 Ohms	0 Ohms X 100	780 Ohms X 100	5K X 100	1.3K X 100	1.1K X 100
Q11	DU10A	1.8K X 100	1.9K X 100	2.2K X 100	1.3K X 100	780 Ohms X 100	1K X 100
Q12	DU10A	3.6K X 100	3.6K X 100	170K R x 10,000	10K R x 10,000	780 Ohms X 100	1K X 100
Q13	DU10A	650 Ohms X 100	780 Ohms X 100	50K X 10,000	8K X 10,000	0	0
Q14	DU4A	0	0	650 Ohms X 100	780 Ohms X 100	400 Ohms X 100	400 Ohms X 100
Q15	DU4A	1K X 100	900 Ohms X 100	1.2K X 100	3.5K X 100	420 Ohms X 100	420 Ohms X 100
Q16	DU2A	1.7K X 100	3.5K X 100	2.4K X 100	1.3K X 100	740 Ohms X 100	1K X 100

*Osc. Sw. "ON"

5.4.2 Focus and Alignment Chassis (Cont'd)

RESISTANCE TO GROUND

Symbol	Type	COLLECTOR -	COLLECTOR +	BASE -	BASE +	EMITTER -	EMITTER +
Q17	DU2A	1.6K X 100	1.6K X 100	170K X 10,000	10K X 10,000	740 Ohms X 100	740 Ohms X 100
Q18	DU2A	620 Ohms R x 100	670 Ohms R x 100	48K R x 10,000	10K R x 10,000	48 Ohms R x 1	22 Ohms R x 1
Q19	DU4A	0	0	620 Ohms R x 100	670 Ohms R x 100	320 Ohms R x 100	320 Ohms R x 100
Q20	DU2A	1K R x 100	1.6K X 100	9.5K X 100	2.4K X 100	840 Ohms X 100	7K X 100
Q21	DU2A	15 Ohms X 1	52 Ohms X 1	9 Ohms X 1	9 Ohms X 1	840 Ohms X 1	7K X 100
Q22	DU4A	2 Meg X 10,000	8K X 10,000	1K X 100	1.6K X 100	280 Ohms X 100	280 Ohms X 100
Q25	DU10						
Q26	DU10						
Q27	DU4						
Q28	DU10						
Q29	DU10						
*Q1	DU4A	Infinity	50K R x 10,000	18K R x 10,000	42K R x 10,000	8K R x 10,000	8K R x 10,000

*Osc. Sw. "OFF"

RESISTANCE IN OHMS TO GROUND. K EQUALS THOUSANDS. M EQUALS MILLIONS.
Measurements made with Simpson Model 260 Multimeter.
Negative Indicator, Negative Ground
Positive Indicator, Positive Ground
Use scale multiplication factor prefixed by "X"

5.4.3 Video Processor

Symbol	Type	COLLECTOR -	COLLECTOR +	BASE -	BASE +	EMITTER -	EMITTER +
Q1	DU17B	420 R x	750 R x	750 R x	750 R x	42 R x	42 R x
Q2	DU17B	65 R x	90 R x	420 R x	420 R x	800 R x	820 R x
Q3	DU17B	6.8K R x	1.3K R x	270 R x	270 R x	5.2K R x	1.6K R x
Q4	DU17B	62 R x	90 R x	6.8K R x	1.3K R x	1.2K R x	1.2K R x
Q5	DU17B	1.1K R x	420 R x	1.2K R x	1.2K R x	120 R x	120 R x
*Q6	DU15B	140 R x	140 R x	1.2K R x	420K R x	1.4K R x	420K R x
Q7	DU14	50 R x	90 R x	220 R x	220 R x	1.1K R x	400K R x
Q8	DU17B	180 R x	180 R x	2.2K R x	1.1K R x	820 R x	180 R x
Q9	DU15B	120 R x	120 R x	500 R x	500 R x	380 R x	380 R x
Q10	DU17B	180 R x	180 R x	2.2K R x	1.1K R x	140 R x	140 R x
Q11	DU17B	280 R x	280 R x	120 R x	120 R x	150 R x	150 R x
Q12	DU17B	280 R x	280 R x	920 R x	850 R x	150 R x	150 R x
Q13	DU15B	280K R x	10K R x	1.1K R x	5K R x	320 R x	320 R x
Q14	DU17B	420 R x	420 R x	1K R x	880 R x	140 R x	140 R x
Q15	DU17B	420 R x	420 R x	120 R x	120 R x	150 R x	150 R x
Q16	DU15B	120 R x	120 R x	500 R x	500 R x	385 R x	385 R x

*Gamma SW (S1) Out Position.

5.4.3 Video Processor (Cont'd)

Symbol	Type	COLLECTOR -	COLLECTOR +	BASE -	BASE +	EMITTER -	EMITTER +
Q17	DU17B	530 R x	530 R x	740 R x	140 R x	42 R x	48 R x
Q18	DU17B	180 R x	180 R x	280K R x	10K R x	1.2K R x	980 R x
Q20	DU17B	640 R x	340 R x	1.2K R x	980 R x	220 R x	220 R x
Q21	DU15B	1.2K R x	920 R x	1.3K R x	4.8K R x	340 R x	340 R x
Q22	DU17B	650 R x 100	340 R x 100	1.2K R x	920 R x	740 R x	740 R x
Q23	DU17B	460 R x	460 R x	1.2K R x	980 R x	100 R x	100 R x
Q24	DU17B	180 R x	200 R x	4.4K R x	1K R x	600 R x	600 R x
Q25	DU15B	35 R x 1	32 R x 1	80 R x	400 R x	220 R x	220 R x
Q26	DU15B	1.1K R x	900 R x	1.4K R x	5K R x	350 R x	350 R x
Q27	DU4	520 R x	510 R x	1.1K R x	5K R x	280 R x	280 R x
Q28	DU1	820 R x	1.1K R x	550 R x	520 R x	880 R x	1.1K R x
Q29	DU17B	320 R x	320 R x	510 R x	510 R x	440 R x	440 R x
Q30	DU17B	460 R x	460 R x	1.2K R x	980 R x	100 R x	100 R x
Q31	DU15B	35 R x	32 R x	80 R x	400 R x	220 R x	220 R x

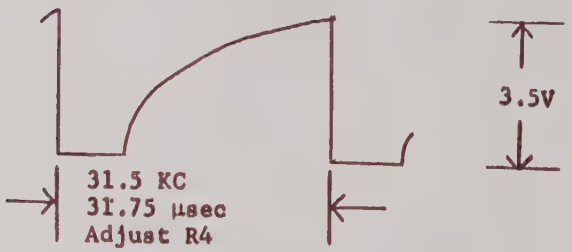
RESISTANCE IN OHMS TO GROUND. K EQUALS THOUSANDS. M EQUALS MILLIONS.
Measurements made with Simpson Model 260 Multimeter.
Negative Indicator, Negative Ground
Positive Indicator, Positive Ground
Use scale multiplication factor prefixed by "X"

5.5 PULSE WIDTH ADJUSTMENTS (525 line Operation) -- See Waveforms on pages 5-10 to 5-14

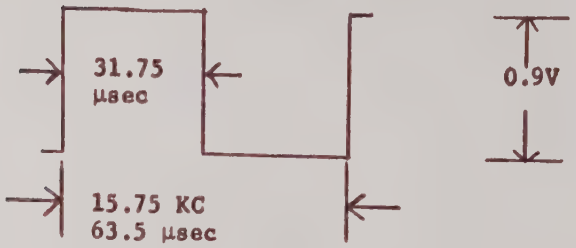
T.P.	Function	"R" Adjustment
2	Hor. Drive & Blk Start	R-14, 3μsec wide
3	Hor. Sync & Eq. Start	R-10, 4.4μsec wide
4	Eq. Stop	R-9, 6.7μsec wide
5	Hor. Dr. Width	R-40, 9.1μsec wide
H. Dr.	Hor. Dr. Width	R-40, 6.3μsec wide
BLK	Horizontal BLK Width	R-50, 11μsec wide

5.5.1 WAVEFORMS (525 Line Operation)

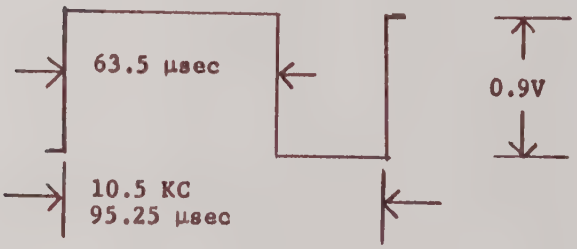
A. Master Oscillator (μL1 Pin 7)



B. 2:1 Binary Counter (μL3 Pin 5)

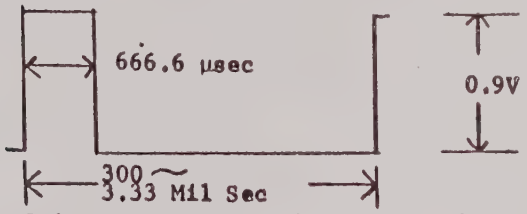


C. 3:1 Binary Counter (μL5 Pin 5)

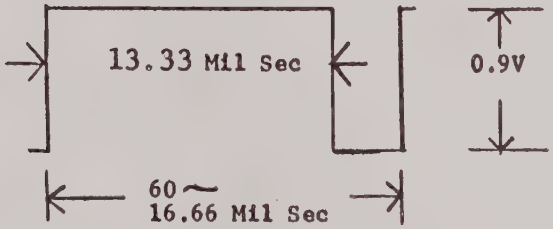


D. 7:1 Binary Counter (μL8 Pin 5)

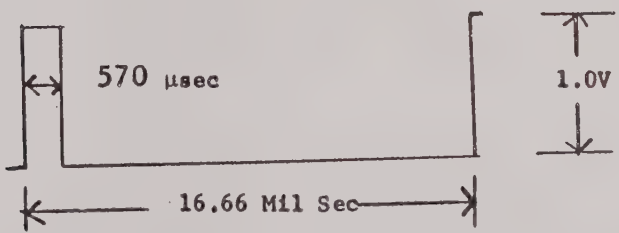
E. 5:1 Binary Counter (μL12 Pin 5)



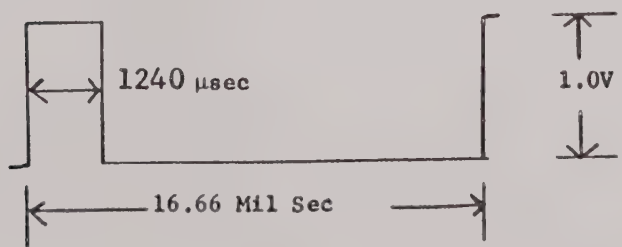
F. 5:1 Binary Counter (μL15 Pin 5)



G. Vertical Drive (μL29 Pin 5)



H. Vertical Blanking (μL30 Pin 5)



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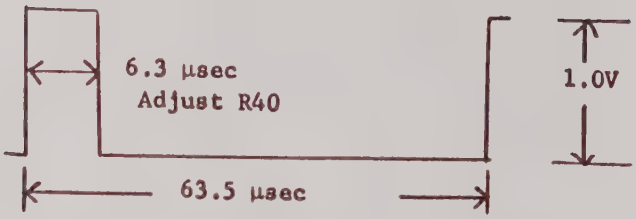
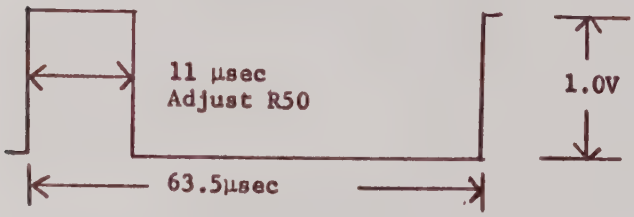
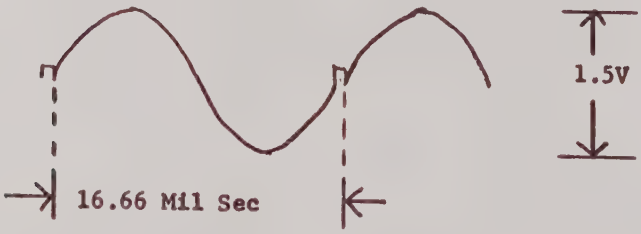
I. Horizontal Drive (μL22 Pin 6)



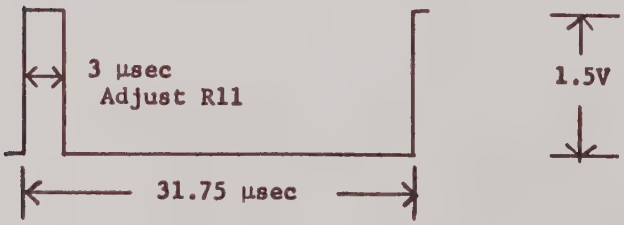
J. Horizontal Blanking (μL23 Pin 6)



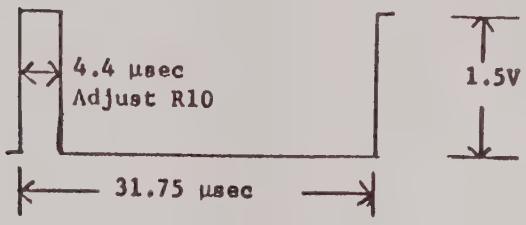
K. AFC (TP1)



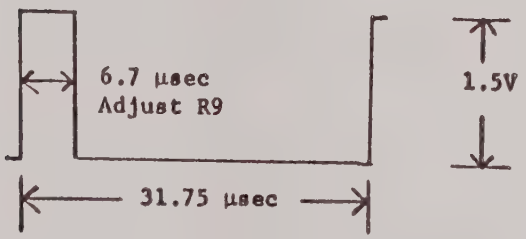
L. Horizontal Drive & Blanking Start (TP2)



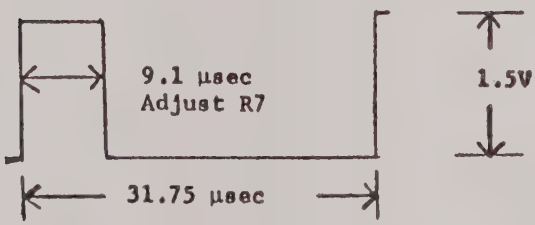
M. Horizontal Sync & Equalizing Start (TP3)



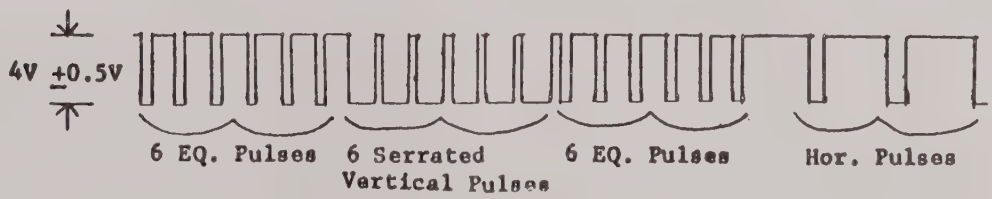
N. Equalizing Stop (TP4)



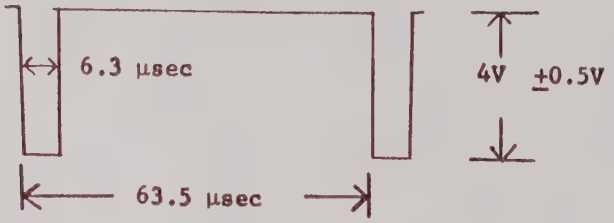
O. Horizontal Sync Stop (TP5)



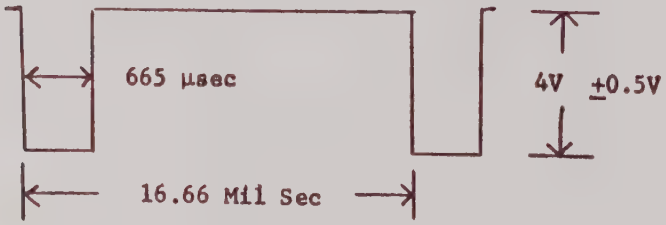
P. Composite Sync (Sync T.P.) Lock to Vertical Drive



Q. Horizontal Drive (H. DR T.P.)



R. Vertical Drive (V. DR T.P.)



S. Mixed Blanking (BLK T.P.)

HOR
(11 µsec Wide)

5.6 SYNC GENERATOR MULTIVIBRATOR SETTINGS

Scan/Format Lines		525	625	875	945	1029
M.O. Freq.	KC	31.5	37.5	52.5	56.7	61.74
C. Set R4 for M.O. Period	µsec	31.75	26.7	19	17.6	16.2
k. Set R11 for H. Drive and Blank Start	µsec	3	2.6	1.9	1.7	1.6
i. Set R9 for Equalizing Stop	µsec	4.4	3.8	2.7	2.5	2.3
m. Set R9 for Equalizing Stop	µsec	6.7	5.8	4.1	3.8	3.5
n. Set R7 for H. Sync Stop	µsec	9.1	7.8	5.6	5.2	4.8
o. Set R40 for H. Drive Output	µsec	6.3	5.3	3.8	3.5	3.2
p. Set R50 for H. Blanking Width	µsec	11	9.2	6.6	6.1	5.6
i. Vert. Drive Output	µsec	665	640	685	740	680
p. Vert. Blanking Output	µsec	1330	1120	1370	1110	1360

6.0 PARTS LIST

This section, which contains an electrical parts list, itemizes and identifies the components found in the following electronic subsystems: camera head, power supply, focus and alignment unit, sync generator (medium temperature), sync generator (high temperature) and the video processor.

CAPACITORS

NOTE: All capacitors are fixed tantalum, ±10%, 35V unless otherwise specified.

***Qty one for 729 line rate system
**Qty one for 525 line rate system
*Qty one for 1029 line rate system

Symbol	Part Number	Description			
C1	0376 9000	Paper,	.01µf,	200V,	10%
C2	0376 4890	Ceramic,	.001µf,	1000V,	
C3	0376 9510	Ceramic,	.01µf,	600V,	
C4	0376 3830	Paper,	.01µf,	200V,	10%
C5	0376 4670		.22µf,		20%
C6	0376 4630		1µf,		
C7	0376 4630		1µf,		
C8	0376 4630		1µf,		
C9	0376 4630		1µf,		
C10	0376 4680		22µf,		
C11	0376 3920	Paper,	.022µf,	200V,	10%
C12	0376 4690		4.7µf,	10V,	
C13*	0376 3890	Paper,	.01µf,	200V,	10%
C13**	0376 3880	Paper,	.01µf,	200V,	
C14	0376 4130	Electrolytic,	175µf,	15V	
C15	0376 4700		47µf,	6V	
C16	0376 4710		47µf,	20V	
C17	0376 3930	Paper,	.0027µf,	200V,	10%
C18	0376 4720		4.7µf,	50V	
C19	0376 3950	Paper,	.082µf,	200V,	10%
C19***	0377 0110	Paper,	.05µf,	200V	
C20*	0376 3890	Paper,	.01µf,	200V,	10%
C20**	0376 3880	Paper,	.01µf,	200V	
C21	0376 4890	Ceramic,	.001µf,	1000V	
C25	0376 3850	Film,	.01µf,	200V	
C26	0376 4730	Film,	60µf,	6V	
C27	0376 4300	Film,	1µf,		
C28	0376 4740	Electrolytic,	6.8µf,		
C29	0376 4740	Electrolytic,	6.8µf,		
C30	0376 4300	Electrolytic,	1µf,		
C31	0376 4300	Electrolytic,	1µf,		
C32	0376 4790	Electrolytic,	33µf,	10V	
C33	0376 4740	Electrolytic,	6.8µf,		

Symbol	Part Number	Description		
C34	0376 4750	10μf,	20V	
C35	0315 0360	Var. Ceramic, 9-180μf,		
C36	0326 4070	Paper, 110μμf,	500V,	5%
C37	0376 4740	Electrolytic, 6.8μf		
C38	0376 4740	Electrolytic, 6.8μf,		
C39	0376 4740	Electrolytic, 6.8μf,		
C40	0376 4650	22μf,	15V	
C41	0376 4300	1μf		
C42	0326 9490	Var. Ceramic, 2-8μμf,	50V	
C43	0376 9170	Mica. 2μμf,	300V	
C44	0376 4730	Paper, 60μf,	6V	
C45	0376 4300	Paper, 1μf		
C46	0376 4740	Electrolytic, 6.8μf		
C47	0376 3830	Electrolytic, 1μf,	200V	
C48	0376 4740	Electrolytic, 66.8μf		
C49**	0376 3880	Paper, .01μf,	-200V	
C50	0376 3830	Paper, .01μf,	200V	
C51	0305 5070	Mica, 39μμf,	500V	
C52				
C53	0377 0010	Paper, .02μf	400V	
C54	0376 3890	Paper, .01μf	200V	

CONNECTOR

J1	0934 5451	
J2	0936 1650	

INDUCTORS AND COILS

L1	DE-23114	Inductor
L2	DE-23112	Inductor
L3	2130 2260	Focus Coil
L4		Deflection Alignment Assembly
L5	2130 3610	Coil, 3.3μf

DIODES

Symbol	Part Number	Description
CR1	2600 6820	FD281
CR2	2600 6820	FD281
CR3	2600 6820	FD281
CR4	2600 6820	FD281
CR5	2600 6820	FD281
CR6	2630 9880	Zener, 1N989B
CR7	2600 6820	FD281
CR8	2631 0950	Diode, Silicon, 1N458

RESISTORS

NOTE: 1. All resistors are fixed, composition, ±5%, 1/4W, unless otherwise specified.
2. Resistance in Ohms
K = Thousands
M = Millions

R2	0203 1380	5.6M,	1/2W,	5%
R3	0235 4770	4.7K,		
R4	0235 4690	2.2K		
R5	0203 0480	1K,	1/2W,	5%
R6	0235 4350	75 Ohms		
R7	0235 4620	1K		
R8	0235 5030	56K		
R9	0235 4770	4.7K		
R10	0235 4750	3.9K		
R11	0235 4850	10K		
R12	0235 4850	10K		
R13	0235 4790	5.6K		
R14	0235 4350	75 Ohms		
R15	0235 4850	10K		
R16	0235 4790	5.6K		
R17	0235 4580	680 Ohms		
R18	0235 4070	5.1 Ohms		
R19	0235 4460	220 Ohms		
R20	0235 4610	910 Ohms		
R21	0203 0240	100		
R22	0113 9970	2.5K,	2W,	10%

Symbol	Part Number		Description	
R23	0266 0430	0.3	1/2W,	1%
R24	0235 5320	910K		
R25	0235 5190	270K		
R26	0235 5210	330K		
R27	0235 5090	100K		
R30	0266 0490	500M	1/2W,	±20%
R31	0235 5050	68K		
R32	0235 4870	12K		
R33	0235 4850	10K		
R34	0235 4640	1.2K		
R35	0235 4990	39K		
R36	0235 4670	1.8K		
R37	0235 5010	47K		
R38	0235 4850	10K		
R39	0235 4760	4.3K		
R40	0235 4580	680 Ohms		
R41	0235 4460	220 Ohms		
R42	0235 4530	430 Ohms		
R43	0235 4770	4.7K		
R44	0235 4790	5.6K		
R45	0235 4720	3K		
R46	0235 4620	1K		
R47	0235 4460	220 Ohms		
R48	0235 4360	82 Ohms		
R49	0235 4930	22K		
R50	0235 4550	510 Ohms		
R51	0235 4550	510 Ohms		
R52	0235 4950	27K		
R53	0235 4730	3.3K		
R54	0235 4820	7.5K		
R55	0235 4310	51 Ohms		
R56	0203 0500	1.2K,	1/2W,	5%
R58	0235 4840	9.1K		
R59	0235 4850	10K		
R60	0203 4970	33K		
R63	0203 0470	910 Ohms,	1/2W,	5%
R64	0235 4770	4.7K		
R65	0235 5010	47K		
R66	0235 5330	1M		
R67	0235 4350	4.3M,	1W,	5%
R68	0235 4650	1.5K		
R69	0235 4140	10 Ohms		
R70	0235 4620	1K		
R71	0235 5330	1M		
R72	0235 5330	1M		
R73	0235 4770	4.7K		

TRANSISTORS

Symbol	Part Number	Description
Q1 And Q2	2600 7070	DU2A
	2600 7050	2N915 Alternate
Q3 Thru Q5	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q6	2631 0100	2N2528
Q7	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q8	3631 1450	2N398
Q11	3631 0090	2N779A
Q12	3631 0090	2N779A
Q13 And Q14	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q15 And Q16	2600 8180	DU14
	2600 8170	2N2369 Alternate
Q17	2600 7060	DU2
	2600 7050	2N915 Alternate

TRANSFORMERS

T1	DE-23113
T2	DE-23114

VIDICON TUBE

V1	2531 4230	Vidicon 8485

6.2 POWER SUPPLY

CAPACITORS

Symbol	Part Number	Description			
		NOTE: All capacitors are electrolytic, 25V $^{+150\%}_{-10\%}$ unless otherwise specified.			
C1	0376 5020	Mylar,	.1µf,	600V,	10%
C2	0376 5000	Mylar,	.1µf,	400V,	10%
C3	0376 5020	Mylar,	.1µf,	600V,	10%
C4	0376 5000	Mylar,	.1µf,	400V,	10%
C6	0376 6920	Mylar,	.47µf,	600V,	10%
C7	0376 5030	Mylar,	.22µf,	600V,	10%
C8	0376 5010	Mylar,	.22µf,	400V,	10%
C9	0376 4150	Electrolytic,	500µf,	25V	
C10	0376 4070		50µf,	50V	
C11	0376 4070		50µf,	50V	
C12	0376 4060		500µf,	15V	
C13	0376 4060		500µf,	15V	
C14	0226 7500		250µf,	50V	
C15	0376 4070		50µf,	50V	
C17	0376 4150		500µf,		//////
C18	0376 4090		40µf		
C19	0376 4110		40µf,	15V	
C20	0376 4090		40µf		
C21	0376 4150		500µf		
C22	0376 4110		40µf,	15V	
C23	0376 6920	Metalized,	.47µf,	600V	

CONNECTOR

P1	0934 5471	Connector Plug

CORD

5026 9641	Power Line Cord, 6 feet

DIODES

Symbol	Part Number		Description
CR1	2600 6720		1N2070
CR2	2600 6720		1N2070
CR3	2600 6720		1N2070
CR4	2600 6720		1N2070
CR9	2600 6720		1N2070
CR11	2600 6720		1N2070
CR13	2630 9840		1N992A
CR14	2600 9220		1N4384
CR15	2600 9220		1N4384
CR16	2630 9730	Zener,	1N752A
CR17	2600 9220		1N4384
CR18	2600 9220		1N4384
CR19	2600 9220		1N4384
CR20	2600 9220		1N4384
CR21	2630 9860	Zener,	1N972A
CR22	2600 9220		1N4384
CR23	2600 9220		1N4384
CR24	2630 9870	Zener,	1N960B
CR25	2630 9730	Zener,	1N752A
CR26	2600 9220		1N4384
CR27	2600 9220		1N4384
CR29	2630 9730	Zener,	1N752A
CR30	2630 9860	Zener,	1N972A
CR31	2600 6910		FD281
CR32	2600 6910		FD281
CR33	2600 6910		FD281
CR34	2600 6910		FD281
CR35	2600 6910		FD281
CR36	2600 6910		FD281
CR37	2600 6910		FD281
CR38	2600 9220		1N4384
CR39	2600 9220		1N4384
CR40	2600 9220		1N4384
CR41	2600 9220		1N4384
CR42	2600 9220		1N4384
CR43	2600 9220		1N4384
CR44	2631 1270	Zener,	1N964B

ELECTRONIC TUBE GAS

Symbol	Part Number	Description	
E1	2531 4280	99V,	±2V
E2	2531 4280	99V,	±2V
E3	2531 4270	82V,	±1V
E4	2531 4270	82V,	±1V
E5	2531 4290	133V,	±3V
E6	2531 4290	133V,	±3V
E7	2531 4270	82V,	±1V

FUSE

F1	1100 0760	AGC,	1 AMP

LIGHT INDICATOR

XDS1	1201 0990	Light Indicator
DS1	1201 1020	Lamp

RESISTORS

///////

Symbol	Part Number	Description

NOTE: All resistors are 1/2W, 5%, unless otherwise specified.

R1	0203 6860	RFC,	39K,	2W,	5%
R3	0203 1060	RFC,	270K,	1/2W,	5%
R4	0266 0750	RWW,	15 Ohms,	3W,	1%
R4	0114 0000	RWW,	75 Ohms,	5W,	1%
R5	0203 0500	RFC,	1.2K		
R6	0203 0560	RFC,	2.2K		
R7	0203 0560	RFC,	2.2K		
R8	0203 6060	RFC,	18		
R9	0203 7440	RFC,	10 Meg.,	2W,	5%
R10	0203 7440	RFC,	10 Meg.,	2W,	5%
R11	0266 6050	RFC,	4.3 Ohms,	1W,	5%

Symbol	Part Number		Description		
R13	0203 0560	RFC,	2.2K		
R14	0203 0960	RFC,	100K		
R17	0203 0320	RFC,	220K,	1/2W,	5%
R18	0203 6450	RFC,	750K,	2W,	5%
R20	0203 0560	RFC,	2.2K,	1/2W,	5%
R21	0266 6050	RFC,	4.3 Ohms,	1W,	5%
R22	0203 6840	RFC,	33K,	2W,	5%

SWITCH

S1	0533 4750	Switch, DPST

TRANSISTORS

Q1	2631 0130	Transistor Ger.,	2N1183
Q2	2600 7170	Transistor Silicon,	DU4A
	26007150	Transistor Silicon,	2N1132 Alternate
Q3	2600 7470	Transistor Silicon,	DU10A
	2600 7450	Transistor Silicon,	2N1711 Alternate
Q4	2600 7170	Transistor Silicon,	DU4A
	2600 7150	Transistor Silicon,	2N1132 Alternate
Q5	2631 0130	Transistor Ger.,	2N1183
Q10	2631 0160	Transistor Silicon,	DU34A
	2631 0140	Transistor Silicon,	2N2890 Alternate
Q12	2631 0160	Transistor Silicon,	DU34A
	2631 0140	Transistor Silicon,	2N2890 Alternate
Q14	2631 0130	Transistor Ger.,	2N1183
Q15	2631 0130	Transistor Ger.,	2N1183

TRANSFORMER

T1	2032 1390	Transfromer Power

6.3 FOCUS AND ALIGNMENT UNIT

CAPACITORS

Symbol	Part Number	Description			
		NOTE: All capacitors are fixed paper, ±10%, 200V, unless otherwise specified.			
C1	0376 4620	Tantalum,	6.8µf,	20%,	6V
C2	0376 4620	Tantalum,	5.8µf,	20%,	6V
C3	0376 4630	Tantalum,	.1µf,	20%,	35V
C4	0376 3830		.1µf		
C5	0376 4800	Tantalum,	.22µf,		6V
C6	0376 4750	Tantalum,	10µf,	20%,	20V
C7	0376 4640	Tantalum,	40.0µf,	20%,	10V
C8	0376 4540	Electrolytic,	25µf,		10V
C9	0302 2010	Mica,	1000pf,	5%,	300V
C10	0376 3900		.22µf,		
C12	0376 4100	Electrolytic,	250µf,		15V
C14	0305 5250	Mica,	220pf,	5%,	500V
C15	0376 3890		.01µf		
C16	0305 5250	Mica,	220pf,	5%,	500V
C17	0376 3900		.22µf		
C18	0376 4120	Electrolytic,	10µf,		15V
C19	0376 4650	Tantalum,	22µf,	20%,	15V
C20	0376 3910		.0047µf		
C21	0376 3830		.1µf		
C22	0376 3830		.1µf		
C23	0376 3890		.01µf		
C26	0376 3830		.1µf		
C27	0305 5310	Mica,	390pf,	5%,	300V
C28	0305 5250	Mica,	220pf,		500V
C29	0305 5310	Mica,	290pf,		300V

DIODES

Symbol	Part Number	Description
CR3	2600 6820	FD281
CR4	2600 6820	FD281
CR6	2600 6820	FD281
CR7	2630 9740	1N937A
CR8	2600 6820	FD281
CR9	2600 6820	FD281
CR10	2600 6820	FD281
CR11	2631 0000	1N658
CR12	2631 0000	1N658

TRANSISTORS

Q1 Thru Q3	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q4	2600 7470	DU10A
	2600 7450	2N1711 Alternate
Q5	2600 7270	DU6A
	2600 7250	2N1893 Alternate
Q6 And Q7	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q8	2600 7470	DU10A
	2600 7450	2N1711 Alternate
Q9, Q10, Q14	2600 7170	DU4
	2600 7150	2N1132 Alternate
Q15	2600 7410	DU9
	2600 7400	2N869 Alternate
Q16 Thru Q18	2600 7070	DU2A
	2600 7050	2N915 Alternate
Q19	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q20 And Q21	2600 7070	DU2A
	2600 7050	2N915 Alternate
Q22	2600 7170	DU4A
	2600 7150	2N1132 Alternate
Q25 And Q26	2600 7460	DU10
	2600 7450	2N1711 Alternate
Q27	2600 7160	DU4
	2600 7150	2N1132 Alternate
Q28 And Q29	2600 7460	DU10
	2600 7450	2N1711 Alternate

RESISTORS

NOTE: 1. All resistors are fixed composition, 5%, 1/2W unless otherwise specified.

2. Resistance value in ohms
K = Thousands
M = Millions

Symbol	Part Number	Description			
R1	0203 0620		3.9K		
R2	0203 0560		2.2K		
R3	0203 0480		1K		
R4	0203 1140		560K		
R5	0203 0720		10K		
R6	0203 0670		6.2K		
R7	0234 8290		2.2K		
R8	0114 0620	Variable,	1K,		10%
R9	0234 8090	Film,	330		
R10	0203 0540		1.8K		
R11	0203 0760		15K		
R12	0203 0640		4.7K		
R13	0266 1080	Wire Wound,	91,	.4W,	1%
R14	0203 0120		33		
R15	0203 3200		68,	1W	
R16	0114 0550	Variable,	250,		10%
R17	0203 3200		68,	1W	
R18	0203 3160		47,	1W	
R19	0114 0550	Variable,	250,		10%
R20	0203 3160		47,	1W	
R21	0203 3160		47,	1W	
R22	0114 0550	Variable,	250,		10%
R23	0203 3160		47,	1W	
R24	0114 0590	Variable,	10K,		10%
R25	0203 0560		2.2K		
R26	0203 0880		47K		
R27	0114 0650	Variable,	50K,		10%
R28	0203 0980		120K		
R29	0203 0210		75		
R30	0203 0500		1.2K		
R31	0203 0700		8.2K		
R32	0114 0590	Variable,	10K,		10%

RESISTORS
(continued)

Symbol	Part Number		Description		
R33	0114 0580	Variable,	2.5K,		10%
R34	0203 0720		10K		
R35	0203 0650		5.1K		
R36	0203 0650		5.1K		
R48	0235 4770		4.7K,	1/4W	
R49	0203 0300		180		
R52	0235 4730		3.3K,	1/4W	
R53	0235 4460		220,	1/4W	
R54	0235 4620		1K,	1/4W	
R55	0235 4810		6.8K,	1/4W	
R56	0114 0580	Variable,	2.5K,		10%
R57	0235 4620		1K,	1/4W	
R58	0235 4730		3.3K,	1/4W	
R59	0235 4620		1K,	1/4W	
R60	0235 5150		180K,	1/4W	
R61	0235 4730		3.3K,	1/4W	
R62	0235 5010		47K,	1/4W	
R64	0235 4540		470,	1/4W	
R65	0235 4350		75,	1/4W	
R66	0235 4380		100,	1/4W	
R67	0235 4140		10,	1/4W	
R68	0203 0340		270		
R69	0203 0340		270		
R70	0203 0520		1.5K		
R71	0203 0680		6.8K		
R72	0266 0450	Wire Wound,	10,	1/4W,	1%
R73	0203 0620		39K		
R74	0203 0320		220		
R75	0235 4690		1K,	1/4W	
R76	0114 0660	Variable,	5M		
R77	0235 5570		10M,	1/4W	
R78	0203 0100		27		
R81	0235 4620		1K,	1/4W	
R82	0235 4810		6.8K,	1/4W	
R83	0114 0580	Variable,	2.5K,		10%
R84	0235 4730		3.3K,	1/4W	
R85	0235 5150		180K,	1/4W	
R86	0235 4620		1K,	1/4W	

RESISTORS
(continued)

Symbol	Part Number		Description		
R87	0235 4730		3.3K,	1/4W	
R88	0235 4770		4.7K,	1/4W	
R89	0235 4620		1K,	1/4W	
R90	0235 4810		6.8K,	1/4W	
R91	0114 0580	Variable,	2.5K,		10%
R92	0235 4730		3.3K,	1/4W	
R93	0235 5150		180K,	1/4W	
R94	0235 4620		1K,	1/4W	
R95	0235 4690		2.2K,	1/4W	
R96	0235 4620		1K,	1/4W	
R97	0235 0500		1.2K		
R98	0114 0640	Variable,	5M,		10%
R99	0114 0640	Variable,	1M,		10%

SWITCH

S1	0533 5340	DPST
S2	0533 5310	DPST

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CRYSTAL OSCILLATOR - (OPTIONAL)

CAPACITORS

C1	0376 3830	Paper,	.1μf,	200V,	10%

CRYSTAL

Y1	2630 9180	31.5KC

RESISTORS

Symbol	Part Number	Description
		NOTE: All 1/4W, 5%, unless otherwise specified.
R1	0235 4540	470
R2	0235 4850	10K
R3	0235 4620	1K
R4	0235 4850	10K
R5	0235 4620	1K
R6	0235 4540	470
R7	0235 4930	22K

TRANSISTORS

Q1	2600 7170	Silicon,	PNP DU4A
Q2	2600 7170	Silicon,	PNP DU4A

6.4 SYNC GENERATOR

CAPACITORS

Symbol	Part Number	Description			
		NOTE: All capacitors are fixed mica ±5%, 500V.			
C1	0376 4040	Tantalum,	225µf,	10V	
C2	0376 4210	Mica,	3300pf		
C3	0376 4210	Mica,	3300pf		
C5	0376 4170	Mica,	510pf		
C6	0376 4270	Ceramic,	.01µf,	50V	
C7	0376 4270	Ceramic,	.01µf,	50V	
C8	0376 4270	Ceramic,	.01µf,	50V	
C9	0376 4280	Ceramic,	.02µf,	50V	
C10	0376 4190		680pf,	300V	
C11	0376 4170		510pf		
C12	0376 4220		680pf,	300V	
C13	0376 4170		510pf		
C14	0376 4170		510pf		
C15	0376 4170		510pf,	510V	
C16	0376 4170		510pf,	510V	
C17	0376 4170		510pf		
C18	0376 4220		820pf,	300V	
C19	0376 4230		1500pf,	100V	
C20	0376 4040	Tantalum,	225µf,	25V,	10%
C21	0376 4300	Tantalum,	1µf,	35V,	10%
C22	0376 4290	Ceramic,	.47µf,	25V,	20%
C23	0376 4290	Ceramic,	.47µf,	25V,	20%
C24	0376 4300	Tantalum,	1µf,	35V	
C25	0376 4300	Tantalum,	1µf,	35V	
C26	0376 9140	Tantalum,	1.1µf,	20V	
C27	0376 4020	Tantalum,	10µf,	25V	
C28	0376 4150	Electrolytic,	500µf,	25V	
C29	0376 4030	Tantalum,	150µf,	6V	
C30	0376 4060	Electrolytic,	500µf,	15V	
C31	0376 4030	Tantalum,	150µf,	6V	
C32	0376 4040	Tantalum,	225µf,	10V	
C33	0376 4010	Tantalum,	10µf,	6V	
C34	0376 4050	Tantalum,	500µf,	6V	
C35	0376 4060	Electrolytic,	500µf,	15V	
C36	0376 4080	Electrolytic,	1000µf,	6V	
C37	0376 4270	Ceramic,	.01µf,	50V	
C38	0376 4270	Ceramic,	.01µf,	50V	

DIODES

Symbol	Part Number		Description
CR1	2600 6820		FD281
CR2	2600 6820		FD281
CR3	2600 6820		FD281
CR4	2600 6820		FD281
CR5	2600 6820		FD281
CR6	2600 6820		FD281
CR7	2600 6820		FD281
CR8	2600 6820		FD281
CR9	2630 9250	Zener,	1N757A
CR10	2630 9260	Zener,	1N748A
CR11	2630 9270		1N4001
CR12	2630 9270		1N4001
CR13	2630 9270		1N4001
CR14	2630 9270		1N4001
CR15	2630 9270		1N4001
CR16	2630 9270		1N4001

MICROLOGIC MEDIUM TEMPERATURE RANGE

UL1	2630 9500		DU47
UL2	2630 9350		DU44
UL3	2630 9640		DU49
UL4	2630 9640		DU49
UL5	2630 9640		DU49
UL6	2630 9640		DU49
UL7	2630 9640		DU49
UL8	2630 9640		DU49
UL9	2630 9550		DU48
UL10	2630 9640		DU49
UL11	2630 9640		DU49
UL12	2630 9640		DU49
UL14	2630 9640		DU49
UL15	2630 9640		DU49
UL16	2630 9550		DU48
UL17	2630 9390		DU20
UL18	2630 9390		DU20
UL19	2630 9390		DU20
UL20	2630 9390		DU20
UL21	2630 9500		DU47
UL22	2630 9440		DU22
UL23	2630 9440		DU22

MICROLOGIC MEDIUM TEMPERATURE RANGE
(Continued)

Symbol	Part Number	Description
UL24	2630 9500	DU47
UL25	2630 9390	DU20
UL26	2630 9500	DU47
UL27	2630 9550	DU48
UL28	2630 9440	DU22
UL29	2630 9390	DU20
UL30	2630 9390	DU20
UL31	2630 9390	DU20

MICROLOGIC HIGH TEMPERATURE RANGE

UL1	2630 9490	DU32
UL2	2630 9340	DU18
UL3	2630 9590	DU35
UL4	2630 9590	DU35
UL5	2630 9590	DU35
UL6	2630 9590	DU35
UL7	2630 9590	DU35
UL8	2630 9590	DU35
UL9	2630 9540	DU38
UL10	2639 5590	DU38
UL11	2639 5590	DU38
UL12	2639 5590	DU38
UL13	2639 5590	DU38
UL14	2639 5590	DU38
UL15	2639 5590	DU38
UL16	2630 9540	DU38
UL17	2639 9390	DU20
UL18	2639 9390	DU20
UL19	2639 9390	DU20
UL20	2639 9390	DU20
UL21	2630 9490	DU32
UL22	2630 9440	DU22
UL23	2630 9440	DU22
UL24	2630 9490	DU32
UL25	2630 9390	DU20
UL26	2630 9490	DU32
UL27	2630 9540	DU38
UL28	2630 9440	DU22
UL29	2630 9390	DU20
UL30	2630 9390	DU20
UL31	2630 9390	DU20

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RESISTORS

NOTE: 1. All resistors are fixed, composition, 5%, 1/4W, unless otherwise specified.
2. Resistance value in ohms:
K = Thousand
M = Million

Symbol	Part Number	Description
R1	0235 4500	330
R2	0235 4710	2.7K
R3	0235 4620	1K
R4	0113 9980	Variable, 10K, 2W, 10%
R5	0235 4460	Wire Wound, 220
R6	0235 4870	12K
R7	0266 0600	Variable, 25K, 1/2W, 10%
R8	0235 4840	9.1K
R9	0266 0600	Variable, 25K, 1/2W, 10%
R10	0266 0590	Variable, 10K, 1/2W, 10%
R11	0266 0590	Variable, 10K, 1/2W, 10%
R12	0235 4830	8.2K
R13	0235 4750	3.9K
R14	0235 4770	4.7K
R15	0235 4710	2.7K
R16	0235 4710	2.7K
R17	0235 4710	2.7K
R18	0235 4710	2.7K
R19	0235 4540	470
R20	0235 4470	240
R21	0235 4470	240
R22	0235 4400	120
R23	0235 4470	240
R24	0235 4470	240
R25	0235 4470	240
R26	0235 4400	120
R27	0235 4470	240
R28	0235 4470	240
R29	0235 4500	330
R30	0235 4140	10
R31	0235 4470	240
R32	0235 4400	120
R33	0235 4400	120
R34	0235 4670	1.8K
R35	0235 4620	1K
R36	0235 5570	10M
R37	0235 5630	18M

RESISTORS
(Continued)

Symbol	Part Number	Description
R38	0235 5250	470K
R39	0235 4620	1K
R40	0266 0590	Variable, 10K, 1/2W, 10%
R41	0235 4730	3.3K
R42	0235 4770	4.7K
R43	0235 4540	470
R44	0235 4890	15K
R45	0114 0590	Variable, 10K, 1/2W, 10%
R46	0235 4770	4.7K
R47	0235 4730	3.3K
R48	0235 4730	3.3K
R49	0235 4730	3.3K
R50	0266 0590	Variable, 10K, 1/2W, 10%
R51	0235 4730	6.8K
R52	0235 4540	470
R53	0235 4400	120
R54	0235 4850	10K
R55	0235 4780	5.1K
R56	0235 4760	4.3K
R57	0235 4620	1K
R58	0235 4470	240 /////
R59	0235 4540	470

TRANSISTORS

Q1	2600 7420	DU9A
Q2	2600 7020	DU1A
Q3	2600 7020	DU1A
Q4	2600 7020	DU1A
Q5	2600 7020	DU1A
Q6	2600 7020	DU1A
Q7	2600 7470	DU10A
Q8	2600 7020	DU1A
Q9	2600 7020	DU1A
Q10	2600 7220	DU5A
Q11	2600 7220	DU5A
Q12	2600 7020	DU1A

TRANSISTORS

Symbol	Part Number	Description
Q13	2600 7020	DU1A
Q14	2600 7220	DU5A
Q15	2600 7420	DU9A
Q16	2630 9240	2N3054
Q17	2630 9240	2N3054
Q18	2600 7020	DU1A

SWITCH

S1		Toggle 3P3T

6.5 VIDEO PROCESSOR

CAPACITORS

Symbol	Part Number	Description
		NOTE: All capacitors are fixed film, ±20%, 200V unless otherwise specified.
C1	0376 4510	Electrolytic, 100μf, 10V
C2	0315 0300	Variable, Ceramic 170-780μμf
C3	0315 0360	Variable, Ceramic 9-180μμf
C4	0376 3880	.1μf
C5	0376 4510	Tantalum, 100μf, 10V
C6	0376 3880	.1μf
C7	0376 3840	.047μf
C8	0376 4520	Tantalum, 1.0μf, 10V
C9	0376 4770	Tantalum, 120μf, 10V
C10	0376 3880	.1μf
C11	0376 3880	.1μf
C12	0376 4530	Tantalum, 300μf, 6V
C13	0376 3880	.1μf
C14	0376 4510	Tantalum, 100μf, 10V

CAPACITORS
(Continued)

Symbol	Part Number	Description		
C15	0376 3880		.1μf	
C16	0376 3880		.1μf	
C17	0376 3850		.01μf	
C18	0376 4510	Tantalum,	100μf,	10V
C19	0376 4510	Tantalum,	100μf,	10V
C20	0376 3880		.1μf	
C21	0315 0370	Variable, Ceramic,	80-5μμf	
C22	0376 3850		.01μf	
C23	0376 4540	Tantalum,	25μf,	10V
C24	0376 3880		.1μf	
C25	0376 3880		.1μf	
C26	0376 4510	Tantalum,	100μf,	10V
C27	0376 4510	Tantalum,	100μf,	10V
C28	0376 4510	Tantalum,	100μf,	10V
C30	0315 0370	Variable, Ceramic,	80-5μf	
C31	0376 3880		.1μf	
C32	0376 4770	Tantalum,	120μf,	10V
C33	0376 3880		.1μf	
C34	0376 4510	Tantalum,	100μf,	10V
C35	0376 4770	Tantalum,	120μf,	10V
C36	0376 3880		.1μf	
C37	0376 4510	Tantalum,	100μf,	10V
C38	0376 3840		.047μf	
C39	0376 3990		.33μf,	80V
C40	0376 4520	Electrolytic,	10μf,	10V
C41	0376 3850		.01μf	
C42	0376 3880		.1μf	
C43	0376 4510	Tantalum,	100μf,	10V
C44	0376 3880		.1μf	
C45	0376 4550	Tantalum,	200μf,	10V
C46	0376 4510	Tantalum,	100μf,	10V
C47	0376 3880		.1μf	
C48	0376 4510	Tantalum,	100μf,	10V
C49	0376 3880		.1μf	
C51	0376 4550	Tantalum,	200μf,	10V
C52	0376 3860		4700μμf	
C54	0376 3850		.01μf	
C55	0376 3880		.1μf	

CAPACITORS
(Continued)

Symbol	Part Number	Description
C56	0376 4550	Tantalum, 200µf, 10V
C57	0376 4510	Tantalum, 100µf, 10V
C59	0376 4540	Tantalum, 25µf, 10V
C60	0376 4550	Electrolytic, 200µf, 10V
C61	0376 4730	Tantalum, 60µf, 6V
C62	0376 4730	Tantalum, 60µf, 6V
C63	0315 0360	Variable, 9-180µµf
C64	0376 4780	56µf, 6V
*C65	0327 6360	47µµf, 100V

DIODES

CR1	2630 9300	HD 1870
CR2	2630 9300	HD 1870
CR3	2630 9300	HD 1870
CR4	2630 9300	HD 1870
*CR5	2631 0760	1N751A
CR6	2630 9300	HD 1870

DELAY LINE

DL1	8830 2530	25MC
DL2	8830 2540	12MC

TRANSISTORS

Q1 Thru Q5	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q6	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q7	2600 8180	DU14
	2600 8170	2N2369 Alternate
Q8	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q9	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q10 Thru Q12	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q13	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q14 And Q15	2600 8350	DU17B
	2600 8320	2N918 Alternate

*Video Polarity Reversal Circuit

TRANSISTORS
(Continued)

Symbol	Part Number	Description
Q16	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q17 Thru Q20	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q21	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q22 Thru Q24	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q25 And Q26	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q27	2600 7160	DU4
	2600 7150	2N1132 Alternate
Q28	2600 7010	DU1
	2600 7000	2N914 Alternate
Q29 And Q30	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q31	2600 8250	DU15B
	2600 8220	2N995 Alternate
Q32	2600 8350	DU17B
	2600 8320	2N918 Alternate
Q33	2600 8190	DU14A
	2600 8170	2N2369 Alternate

//////

RESISTORS

Symbol	Part Number		Description
		NOTE: 1.	All resistors are fixed composition 5%, 1/4W unless otherwise specified.
		2.	Resistance in Ohms - K = Thousands M = Millions
R1	0235 4500		330
R2	0114 0540	Variable,	100
R3	0235 4750		3.9K
R4	0235 4620		1K
R5	0235 4260		33
R6	0235 4140		10
R7	0235 4480		270
R8	0235 4310		51

RESISTORS

Symbol	Part Number	Description
R9	0235 4580	680
R10	0235 4780	5.1K
R11	0235 4620	1K
R12	0114 0560	Variable, 500
R13	0235 4460	220
R14	0235 4480	270
R15	0235 4310	51
R16	0235 4140	10
R17	0235 4450	200
R18	0235 4220	22
R19	0235 4310	51
R20	0235 4420	150
R21	0235 4580	680
R22	0235 4590	750
R23	0235 4480	270
R24	0235 4140	10
R25	0235 4640	1.2K
R26	0235 4480	270
R27	0235 4140	10
R28	0235 4650	1.5K
R29	0235 4580	680
R30	0114 0560	Variable, 500
R31	0235 4260	33
R32	0235 4580	680
R33	0235 4450	200
R34	0235 4580	680
R35	0235 4620	1K
R36	0235 4360	82
R37	0235 4400	120
R38	0235 4580	680
R39	0235 4440	180
R40	0235 4420	150
R41	0235 4440	180
R42	0235 4420	150
R43	0114 0540	Variable, 100, 1/2W, 10%
R44	0235 4340	68
R45	0235 4140	10Ω
R46	0235 4710	2.7K
R48	0235 4420	150
R49	0235 4420	150
R50	0235 4450	200

RESISTORS
(Continued)

Symbol	Part Number	Description		
R51	0235 4360	82		
R53	0235 4580	680		
R54	0235 4620	1K		
R55	0235 4620	1K		
R56	0235 4450	200		
R57	0235 4460	220		
R58	0235 4730	3.3K		
R59	0235 4540	470		
R60	0235 4780	5.1K		
R61	0235 4260	33		
R62	0235 4620	1K		
R63	0114 0670	Variable,	500,	1/2W
R64	0235 4140		10	
R65	0114 0010	Deposited,	500,	1/10W, 1%
R66	0114 0020	Deposited,	150,	1/10W, 1%
R67	0235 4140		10	
R69	0235 4780		5.1K	
R70	0235 4500		330	
R71	0235 4620		1K	
R72	0235 4500		330Ω	
R73	0235 4780		5.1K	///////
R74	0235 4650		1.5Ω	
R75	0235 4520		290Ω	
R76	0235 4420		150	
R77	0235 4560		560	
R78	0235 4310		51	
R79	0235 4260		33	
R80	0114 0570	Variable,	1K	
R81	0235 4500		330	
R82	0235 4620		1K	
R83	0235 4350		75	
R84	0235 4780		5.1K	
R85	0235 4780		5.1K	
R86	0235 4550		510	
R87	0235 4400		120	
R88	0235 4620		1K	
R89	0235 4620		1K	
R90	0235 4260		33	

RESISTORS
(Continued)

	Symbol	Part Number		Description		
	R91	0235 4310		51		
	R92	0235 4460		220		
	R93	0114 0540	Variable,	100,	1/2W,	10%
	R94	0235 4620		1K		
	R95	0235 4450		200		
	R96	0235 4310		51		
	R97	0235 4780		5.1K		
	R98	0235 4650		1.5K		
	R99	0235 4520		390		
	R101	0235 4420		150		
	R102	0235 4350		75		
	R103	0235 4260		33		
	R104	0235 4400		120		
	R106	0235 4730		3.3K		
	R107	0235 4470		240		
*	R108	0235 4750		3.9K		
*	R109	0114 0570		1K,	1/2W,	20%
*	R110	0235 4390		110		
*	R111	0235 4340		68		
*	R112	0235 4310		51		
*	R113	0235 4610		910		
*	R114	0235 4520		390		

SWITCH

	S1	0533 4760	Switch, SPST
*	S2	0533 4650	Switch, DPDT

* Video Polarity Reversal Circuit

7.0 BLOCK DIAGRAMS

This section contains the following listed block diagrams which are useful in determining overall function of the electronic subsystems used in the TCS-950 Television Camera System:

Ref. No.	Subsystem
7.1	Power Supply
7.2	Focus and Alignment
7.3	Camera Head
7.4	Video Processor

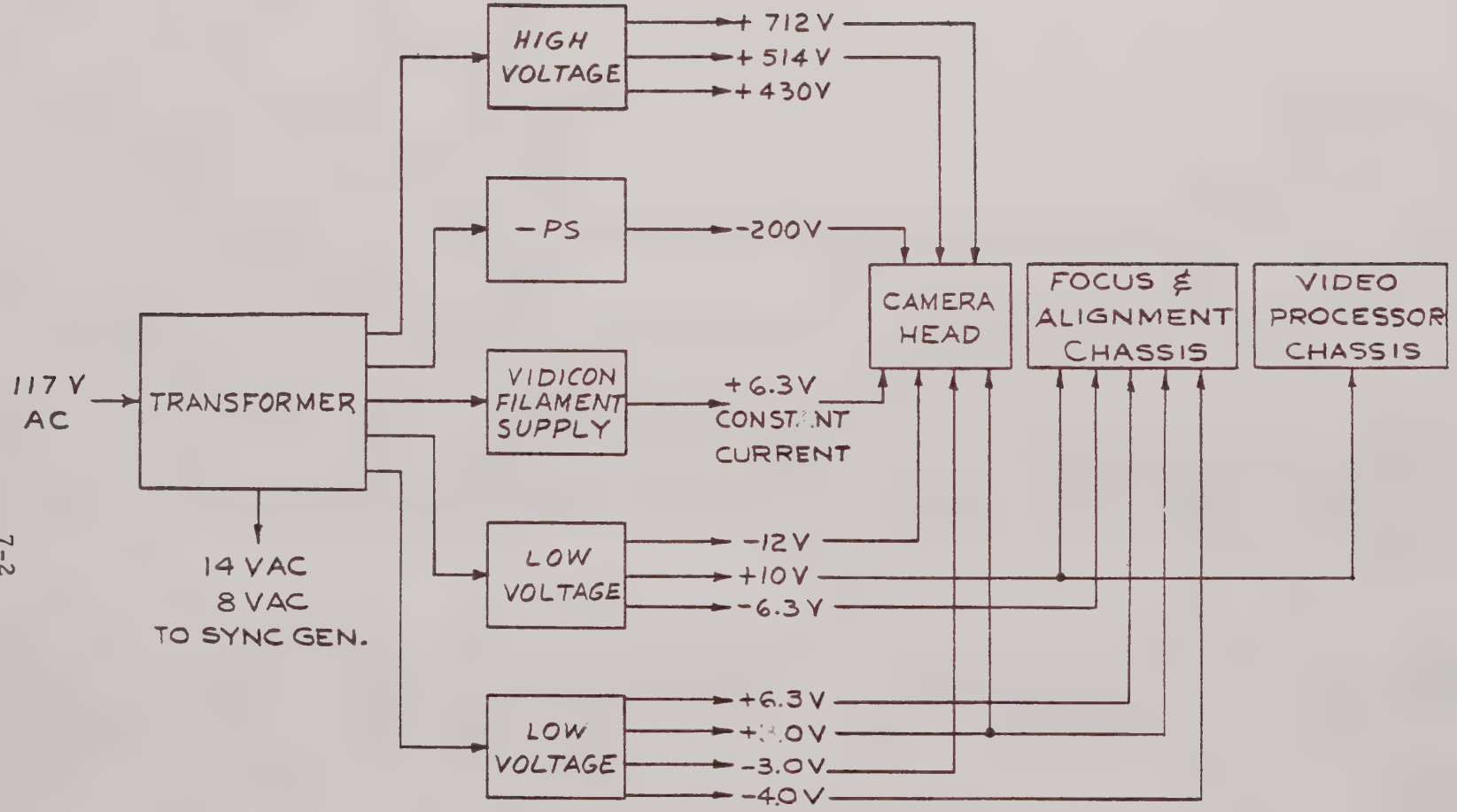


FIGURE 7.1

POWER SUPPLY BLOCK DIAGRAM

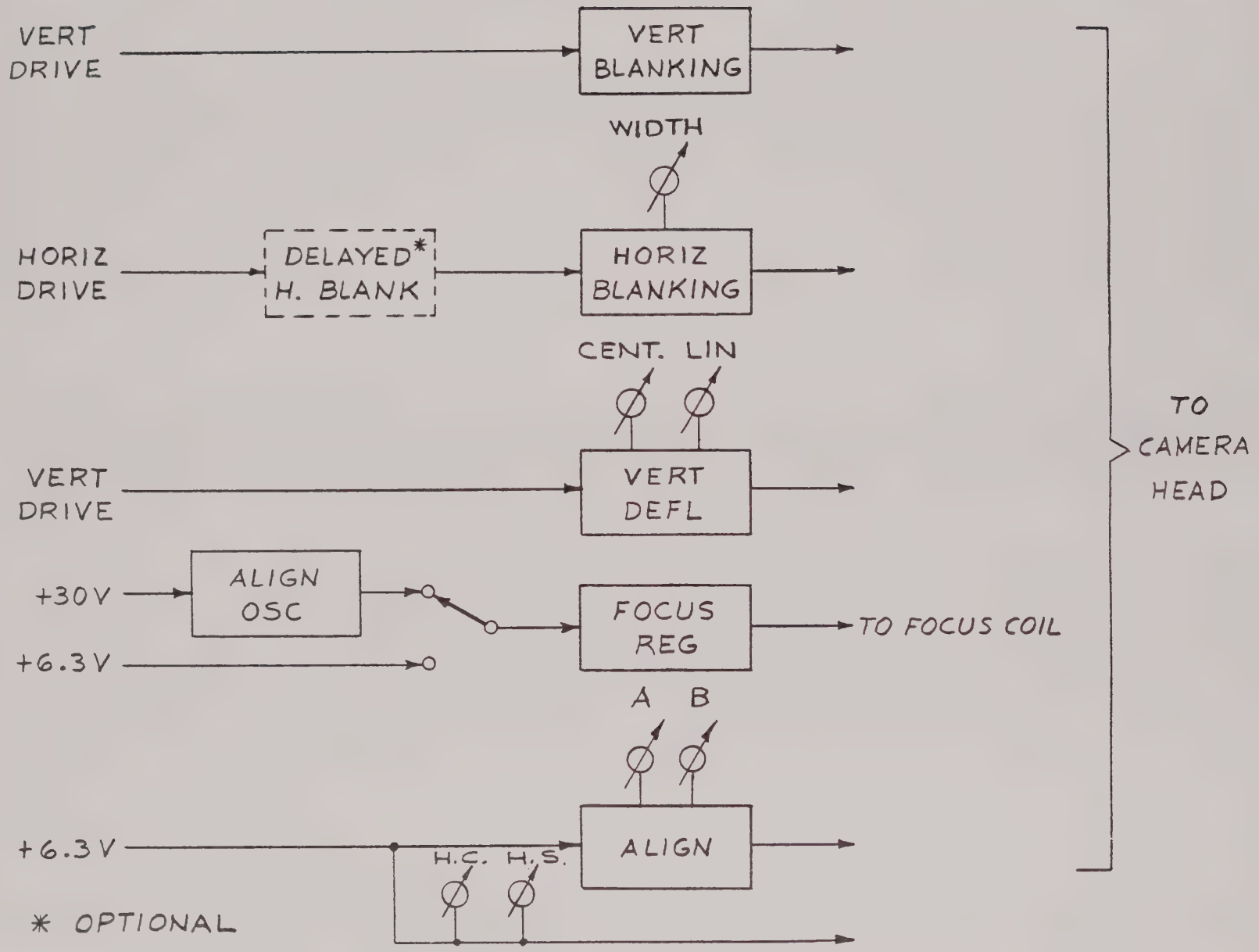


FIGURE 7.2 - FOCUS & ALIGNMENT CIRCUIT BLOCK DIAGRAM

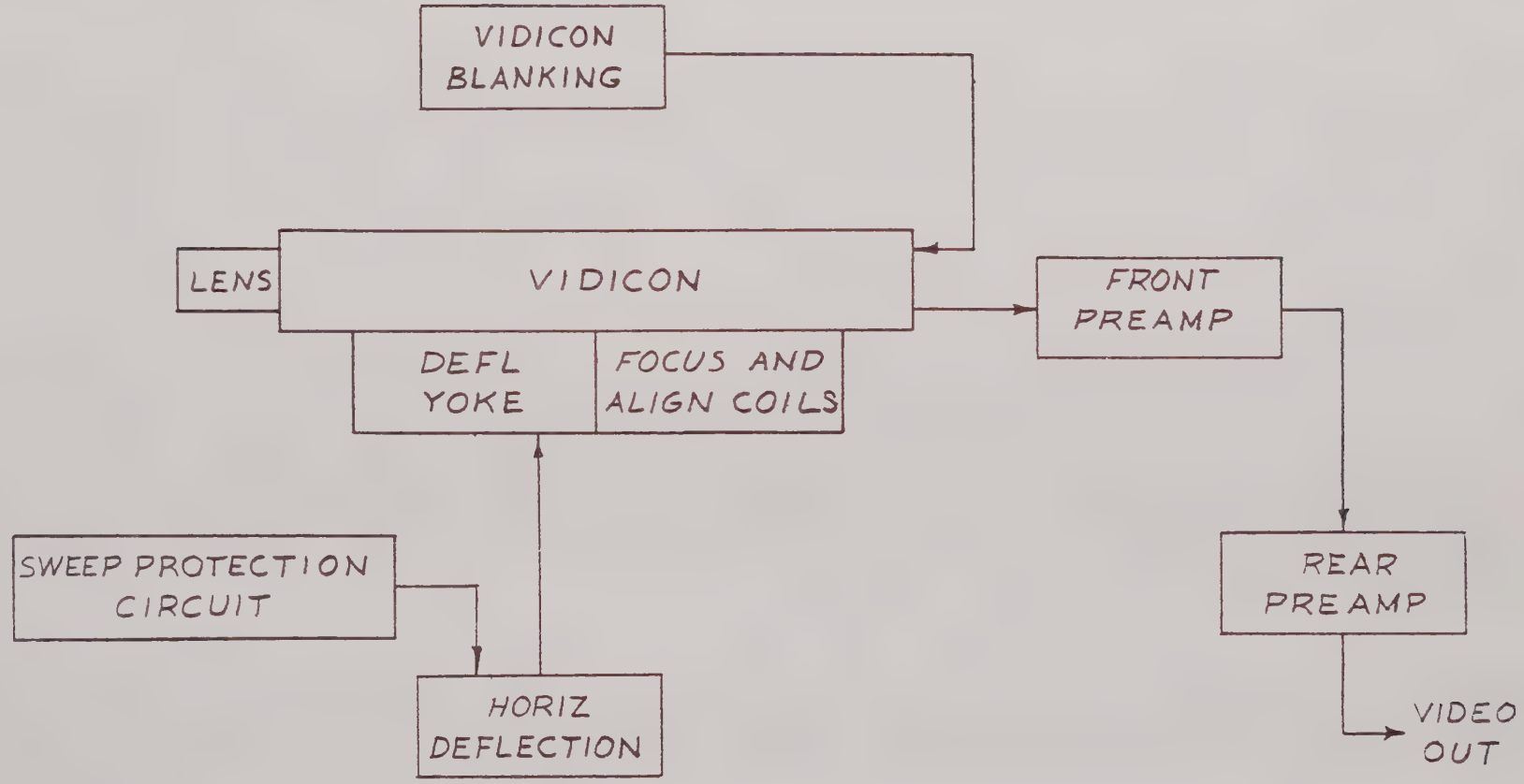


FIGURE 7.3

CAMERA HEAD BLOCK DIAGRAM

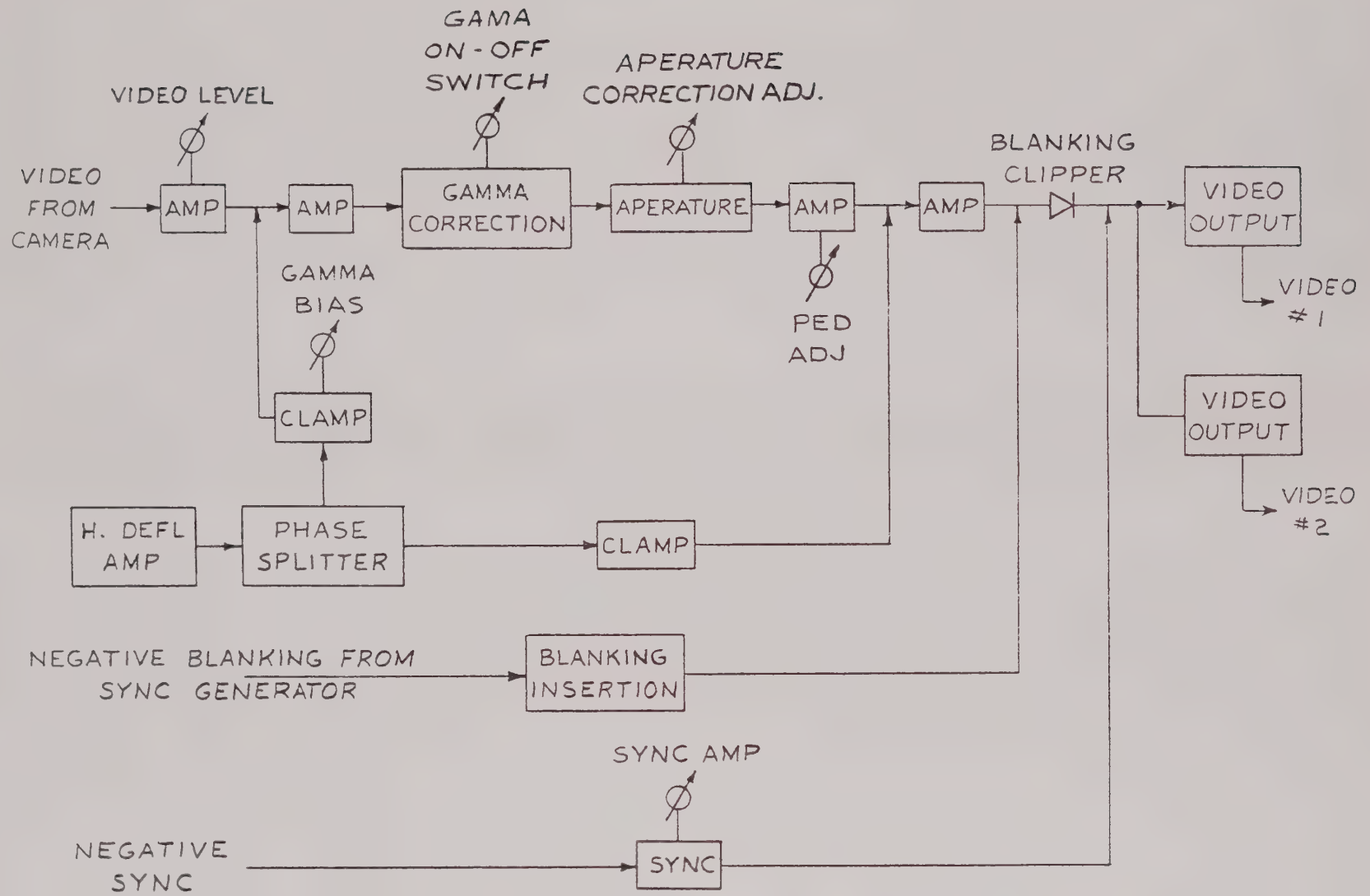


FIGURE 7.4

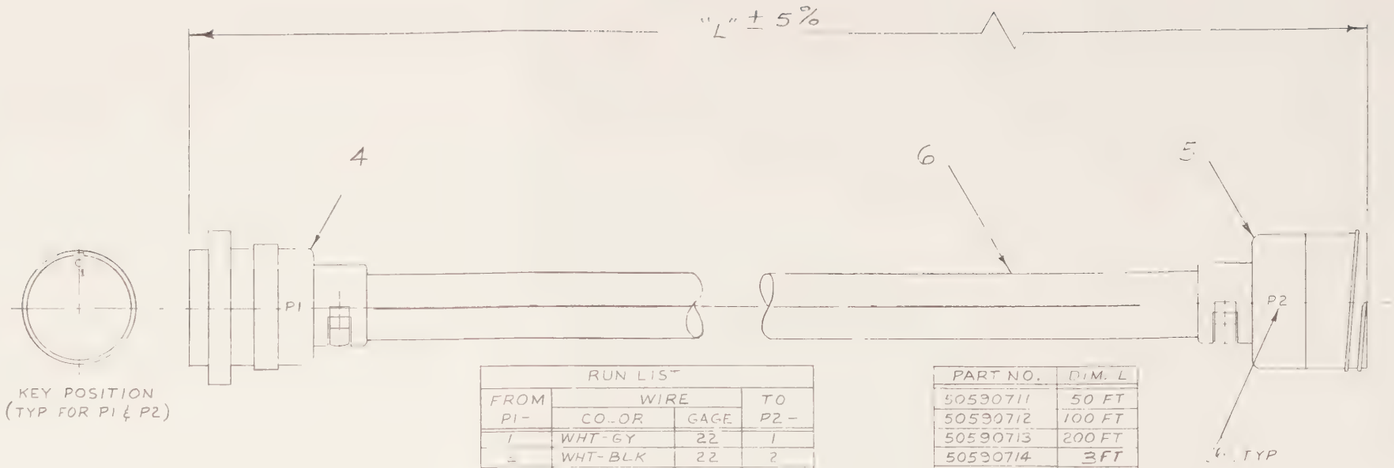
VIDEO PROCESSOR BLOCK DIAGRAM

8.0 SCHEMATICS

This section contains schematics for the following TCS-950 Television Camera System subassemblies: Power Supply, Focus and Alignment, Camera Head, Video Processor, Sync Generator (including Multivibrator Settings Vs Line Rates), Interconnecting Wiring Diagram and Cable Assembly.

NOTES:

1. TWISTED PAIR
2. TWISTED TRIPLE
3. TAPE P2 END OF EACH WIRE WITH FIND NO. 12 AND DRESS WITHIN CONNECTOR HOUSINGS.
4. SEE DETAIL A.
5. SOLDER USING FIND NO. 15.
6. P1 & P2 ARE FOR REFERENCE ONLY. DO NOT MARK CONNECTORS.
7. "L" DIMENSION FOR PART NO. 50590714 THRU 50590715 SHALL BE DETERMINED BY SALES DEPARTMENT PER CUSTOMER'S REQUIREMENTS. MAXIMUM LENGTH SHALL BE 1000 FEET.
8. SEE DETAIL B.
9. CONNECT ALL ENDS TOGETHER AND CONNECT TO PIN 22 (GND).



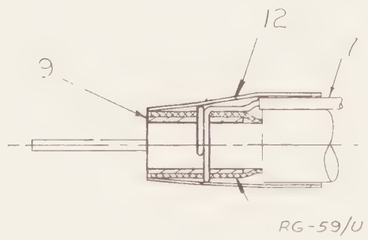
KEY POSITION
(TYP FOR P1 & P2)

PART NO.	DIM. L
50590711	50 FT
50590712	100 FT
50590713	200 FT
50590714	3FT
50590715	
50590716	
50590717	
50590718	
50590719	

7

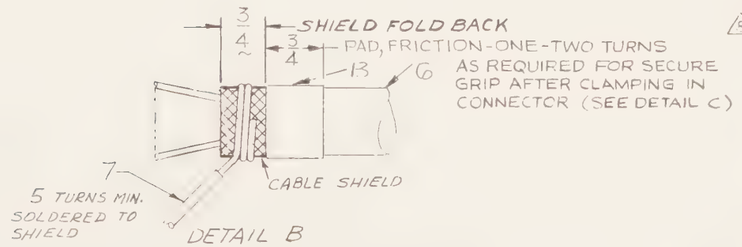
RUN LIST

FROM P1-	WIRE COLOR	WIRE GAGE	TO P2-
1	WHT-GY	22	1
2	WHT-BLK	22	2
3	WHT-RED-BLK	22	3
4	WHT-ORN-ORN	22	4
5	WHT-GRN	18	5
6	WHT-YEL	18	6
7	WHT-BRN-BLU	20	7
8	WHT-RED-RED	22	8
9	COAX #1	INNER CONDUCTOR	9
10	COAX #1	SHIELD	10
11	COAX #2	INNER CONDUCTOR	11
12	WHT-BRN-ORN	20	12
13	COAX #2	SHIELD	13
14	WHT-BLU	22	14
15	WHT-RED-VIO	22	15
16	WHT-VIO	22	16
17	WHT-BRN-RED	20	17
18	WHT-BRN-YEL	20	18
19	WHT-RED-YEL	22	19
20	WHT-RED-ORN	22	20
21	WHT-RED-GRN	22	21
22	WHT-ORN	18	22
23	WHT-BRN	18	23
24	WHT-RED	18	24
25	DRAIN WIRE FR PAIR	18	25
26	DRAIN WIRE FOR PAIR	18	26
27	CABLE SHIELD	-	27
28	WHT-RED-BLU	22	28
29	WHT-BRN-VIO	22	29
30	WHT-RED-GY	22	30
31	COAX #3	INNER CONDUCTOR	31
31 SHELL	COAX #3	SHIELD	31 SHELL
9	WHT-BRN-GY	22	TO CONNECTION 3
	WHT-BRN-BLK	22	
	WHT-BRN-GRN	20	
	WHT-BRN-BRN	20	

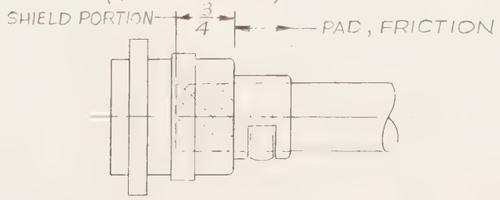


RG-59/U SHIELD

DETAIL A
SCALE: 4/1
(TYP BOTH ENDS)



DETAIL B
SCALE: NONE
(TYP BOTH ENDS)



DETAIL C
CABLE ANCHORING
SCALE: NONE
(TYP - BOTH ENDS)

CABLE ASSEMBLY
SPECIAL PURPOSE, ELECTRICAL

50590711 THRU 50590719

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTORS ARE ½W
   CAPACITANCE VALUE IS
   MICROFARADS

R4	TO BE USED WITH DICON
15Ω 3W 1%	9485
7.5Ω 5W 1%	7735-8507

TI-TAP	FOR USE WITH CABLE LGT
11-12	0-333 FT
10-12	333 - 666 FT
9-12	666 - 1000 FT

T1
117V- 230VAC
60 CPS

1A F1
SW1
117 VAC.

R1 39K 2W
R22 68K 5W
E1 Z10QR12
E2 Z5QR12
E3 Z5QR7
E4 Z5QR7
E5 Z133R6
E6 Z133R6
E7 Z5QR7
C1 .1 600V
C2 .1 400V
C3 .1 600V
C6 .47 600V
C23 .47 600V
R9 10MEG 3W
R10 10MEG 3W
R11 11.0Ω
CR1 (4) IN2070
CR2

P1-15 +514V
P1-28 +350V
P1-14 +712V
+430V
-200V
P1-23 VIDICON FILAMENT
P1-24 VIDICON FILAMENT
+30V
-30V
P1-25 DRAIN-TRIPLE
P1-26 DRAIN-PAIR
+6.3V → TO VERT. DEFL IN FOCUS REGULATOR CHASSIS
+10V
-6.3V
P1-18 -12V SUPPLY TO HEAD
P1-27 CABLE SHIELD
GND
-40V (TO FOCUS & ALIGNMENT)

CR3 CR4
CR9 CR11
(2) IN2070
C7 .22 600V
R3 270K
C8 .22 400V
CR13 IN992A
2N1183
P4 SEE TABLE
CR14 IN4384
CR15 IN4384
CR38 IN4384
CR39 IN4384
CR16 IN752A
C9 500 25V
R2 1.2K
Q2 DU4A OR 2N1132
CR7 IN4384
CR10 IN4384
CR12 IN4384
C10 50 50V
R6 2K
Q3 DU10A OR 2N1711
TP1 GRN
CR30 IN972A
C11 50 50V
R7 22Ω
C14 150 50V
R5 18 2W
Q4 DU4A OR 2N1132
Q5 2N1183
TP2 BRN
CR21 IN972A
C15 50 50V
CR19 IN4384
CR20 IN4384
CR22 IN4384

CR40 IN4384
CR23 IN4384
CR41 IN4384
CR42 IN4384
CR43 IN4384
R11 4.3Ω 1W
C17 500 25V
R13 2.2K
R12 4.3Ω 1W
TB1-9
TB1-10
TB1-11
TB1-12
TO SYNC GENERATOR
Q11 DU34A OR 2N2890
R24 IN960B
CR31 FD841
CR32 FD841
CR33 FD841
C12 500 15V
C13 500 15V
C20 40 25V
R17 220
Q12 DU34A OR 2N2890
CR34 FD841
CR35 FD851
CR25 IN752A
C19 40 15V
CR44 IN964B
Q14 2N1183
R20 2.2K
C18 40 25V
CR26 IN4384
C21 500 25V
CR27 IN4384
CR36 FD841
CR29 IN752A
CR37 FD841
Q15 2N1183
R18 750 2W
C22 40 15V

9.1V - IN960B - 5%
30V - IN972A - 10%
11V - IN962A - 10%
6.8V - IN957B - 5%
5.6V - IN752A - 5%
150V - IN3048B - 5% 1W
200V - IN992A - 10%
200V - IN3051B - 5% 1W
13V - IN964B - 5% 400MW

POWER SUPPLY TCS950
SCHEMATIC DIAGRAM

66322711

HORIZONTAL BLANKING

+10V

R65 75 1/4W

R66 100 1/4W

R67 10 1/4W

C19 22 15V

HOR. DRIVE

V. DRIVE

SYNC. GEN.

SEE NOTE 2

C14 220UUF 500V

R52 2.5K

R53 2.5K 2W

R55 2.5K 1/4W

C15 .01 200V

R54 1K 1/4W

R57 1K 1/4W

Q15 DU9 OR 2N869

R58 2.2K 1/4W

R60 18K 1/4W

C16 220UUF 500V

Q16 DU2A OR 2N915

Q17 DU2A OR 2N915

R59 1K 1/4W

R61 1.2K 1/4W

R62 47K 1/4W

C17 .1 200V

C18 .1 200V

Q18 DU4A OR 2N1132

Q19 DU4A OR 2N1132

R63 1.2K

R64 1.2K

R65 1.2K

R66 1.2K

-6.3V

+10V

SEE NOTE 1

DELAYED HORIZONTAL BLANKING

+30V

R97 1.2K

CR7 IN937A

(CR11)

R82 4.7K 1/4W

R84 3.3K 1/4W

R85 180K 1/4W

R87 3.3K 1/4W

R88 4.7K 1/4W

R89 1K 1/4W

(CR12)

R90 6.8K 1/4W

R92 3.3K 1/4W

R93 180K 1/4W

R95 2.2K 1/4W

R94 1K 1/4W

C26 1 200V

CR6 FD281

C27 330PF 300V

C28 220PF 300V

C29 390PF 300V

Q25 DU10 OR 2N1711

Q26 DU10 OR 2N1711

Q27 DU4 OR 2N1132

Q28 DU10 OR 2N1711

Q29 DU10 OR 2N1711

R81 2.5K HOR. DELAY

R91 2.5K HOR. DELAY

CR8 FD281

CR9 FD281

CR10 FD281

R86 1K 1/4W

R96 1K 1/4W

LINES PER FRAME	JUMPER A
525	JUMPER
675	JUMPER
875	IN658
945	IN658
1029	IN658

VERTICAL BLANKING

-6.3V

R49 180

C8 25 -10V

Q14 DU4A OR 2N1132

C12 250 15V

R48 1M

VERTICAL DEFLECTION

+6.3V

R70 1.5K

R74 220

C9 1000UUF

Q22 DU4A OR 2N1132

Q20 DU2A OR 2N915

Q21 DU2A OR 2N915

C7 40 10V

R72 10 1/4W

C10 22 200V

R73 3.9K

R75 2.2K 1/4W

V SIZE CW

R24 180K

Q6 DU4A OR 2N1132

Q7 DU4A OR 2N1132

R25 2.2K

R26 47K

R29 75

C5 .32 6V

C6 10 20V

R30 1.2K

R32 CW 10K

R34 10K

R71 6.8K

VERT. CENT

R35 5.1K

R33 2.5K

R36 5.1K

R68 270

R69 270

R78 39

+10V

GND

-6.3V

+6.3V

+30V

-40V

FROM POWER SUPPLY

ALIGNMENT OSCILLATOR

R1 3.9K

R2 2.2K

C1 68 6V

C2 68 6V

R3 1K

C3 1 35V

Q1 DU4A OR 2N1132

R5 10K

R4 560K

R76 5 MEG CW

R6 6.2K

R8 1K FOCUS

R9 330

S1 ALIGN. ON

FOCUS REGULATOR

+6.3V

R7 2.2K

R10 1.8K

C22 .1 200V

Q2 DU4A OR 2N1132

Q3 DU4A OR 2N1132

R13 75 2W

ALIGNMENT

R15 68 1W

R18 47 1W

R21 47 1W

R24 10K H. SIZE CW

R16 250 H. CENT CW

R19 250 ALIGN A CW

R22 250 ALIGN B CW

Q4 DU10A OR 2N1711

Q5 DU4A OR 2N1132

C21 .1 200V

R11 15K

R12 4.7K

R14 33

R17 68 1W

R20 47 1W

R23 47 1W

+430V

AUTO

MANUAL

S2 MANUAL-AUTO TARGET

R77 10 MEG 1/4W

TARGET

R78 5M

P1-30

TARGET

-200V

BEAM

R99 1M CW

P1-2 BEAM CURRENT

P1-19

FRONT PANEL

HOR. BLANKING P1-9 P1-10

V. BLANKING P1-11 P1-13

VERT. SAW OUTPUT; P1-12

SWEEP PROTECTION; P1-29

YOKE RETURN P1-17

FOCUS P1-3

FOCUS RETURN P1-4

TO HEAD

H. SIZE P1-8

H. CENT P1-7

ALIGN A P1-6

ALIGN. B P1-5

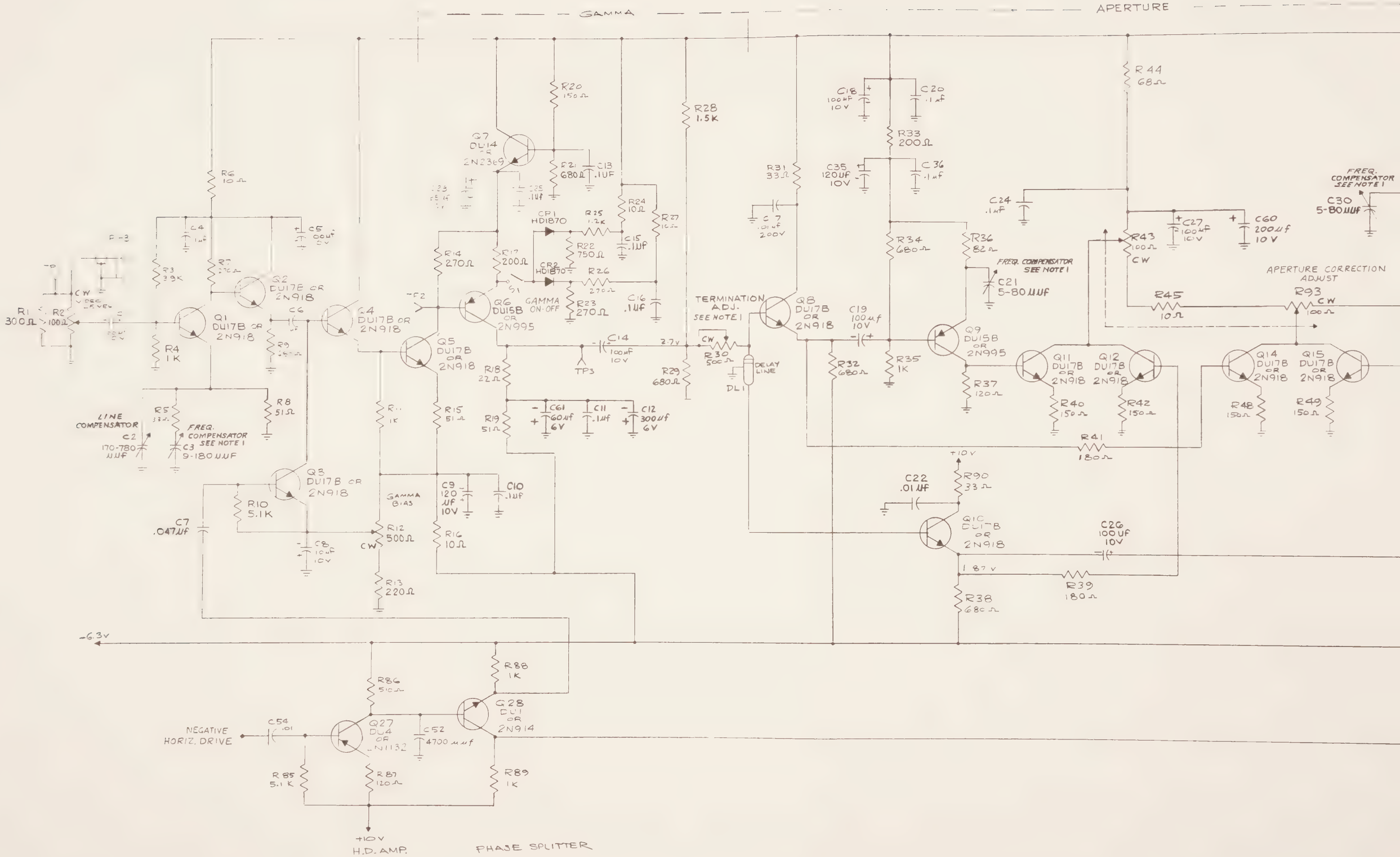
FOCUS & ALIGNMENT CHASSIS
SCHEMATIC DIAGRAN

66322731

NOTES:

1. ADJUST ONLY DURING FREQ RESPONSE TESTS.

2 VIDEO POLARITY REVERSAL CIRCUIT OPTIONAL. Q16, EMITTER NORMALLY CONNECTED TO Q20 BASE.



POLARITY REVERSAL

SEE NOTE 2

S2-A POLARITY REVERSAL

POS

NEG

R110 330

+10V

Q33 DU14A OR 2N2369

Q32 DU17B OR 2N918

R113 910

POS

S2-B

NEG

C65 47uuf

R111 68

R114 390

CR5 IN751A

R112 51 1/2W

-6.3V

VIDEO OUTPUT STAGES

+10V

R50 200Ω

C32 120 uf 10V

C31 .1uf

R56 200Ω

R61 33Ω

C41 .01uf 200V

R64 10Ω

R108 3.9K

CW

WHT PEAK CLIPPER

R109 1K

C64 50uf 6V

C49 .1uf

R78 51Ω 1/4 W

R51 82Ω

R53 680Ω 1/10W

Q16 DU15B OR 2N995

C33 .1uf

78V

C37 100 uuf

C42 .1uf

C43 100uf 10V

C47 .1uf

R73 5.1K

R75 390Ω

R79 33Ω

C51 200 uf 10V

R96 51Ω

R54 1K 1/10W

R46 2.7K

R57 220Ω

Q17 DU17B OR 2N918

Q29 DU17B OR 2N918

R65 500Ω

TP5

CR6 HD1870

Q23 DU17B OR 2N918

Q25 DU15B OR 2N995

TP6

C55 .1uf

C56 200 uf 10V

C34 .001uuf 10V

TP4

C39 .33uf

CR3 HD1870

C48 100uf 10V

VIDEO OUTPUT #1

R55 1K

R107 240Ω

R91 51Ω

R59 470 1/10W

Q18 DU17B OR 2N918

SEE NOTE 2

Q20 DU17B OR 2N918

R95 200Ω

R74 1.5K

R76 150Ω

R83 75Ω

R62 1K

R66 150

R99 390Ω

R103 33Ω

TP7

R104 120Ω

C63 9-180 uuf

FREQ COMPENSATOR SEE NOTE 1

Q13 DU15B OR 2N995

C44 .1uf

C45 200 uf 10V

C62 60uf 6V

R97 5.1K

Q19 DU15B OR 2N995

Q31 DU15B OR 2N995

VIDEO OUTPUT #2

C57 100 uf 10V

R98 1.5K

R101 150Ω

R102 75Ω

R94 1K

R67 10Ω 1/10W

C38 .047 uf

R60 5.1K

CW

PEDISTAL R63 500Ω SET-UP

R92 220Ω

FRONT PANEL

C40 10uf 10V

R70 330Ω

R69 5.1K

Q21 DU15B OR 2N995

Q22 DU17B OR 2N918

C46 100uf

R71 1K

R72 330Ω

NEGATIVE BLANKING

R81 330Ω

Q24 DU17B OR 2N918

Q26 DU15B OR 2N995

C28 100uf

NEGATIVE SYNC

R106 3.3K

R84 5.1K 1/10W

R77 560Ω

R82 1K

SYNC AMPLITUDE

CR4 HD1870

R80 1K CW

SYNC AMP

C59 25uf 10V.

R58 3.3K

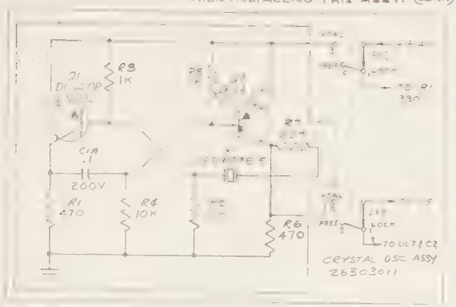
-6.3V

VIDEO PROCESSOR TC950
SCHEMATIC DIAGRAM

66322741

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS ±5%.
   RESISTORS ARE ¼ WATT.
   CAPACITANCE VALUES ARE IN MICROFARADS.
2. PULSE WIDTHS SHOWN ARE FOR 525 LINE OPERATION ONLY.
3. WHERE TWO "DU" TYPES ARE SHOWN, UPPER TYPE INDICATES HIGH TEMPERATURE RANGE MICROLOGIC UNIT. [TO BE USED IN SYNC GENERATOR/H (SUBASSEMBLY)]; LOWER TYPE INDICATES MEDIUM TEMPERATURE RANGE MICROLOGIC UNIT. [TO BE USED IN SYNC GENERATOR/M (SUBASSEMBLY)]. WHERE ONE "DU" TYPE IS SHOWN, THAT TYPE SHALL BE USED IN BOTH SYNC GENERATOR SUBASSEMBLIES. SEE LM 8431721 & 8431201.
4. FOR UNITS REQUIRING A CRYSTAL CONTROLLED MASTER OSCILLATOR (ASSY. 2693011) SEE SCHEMATIC BELOW FOR CHANGES AND CONNECTIONS WHEN INSTALLING THIS ASSY. (CONT.)

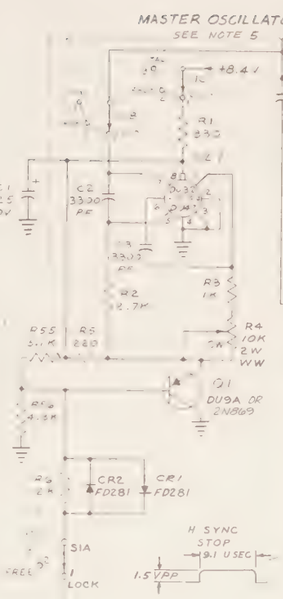


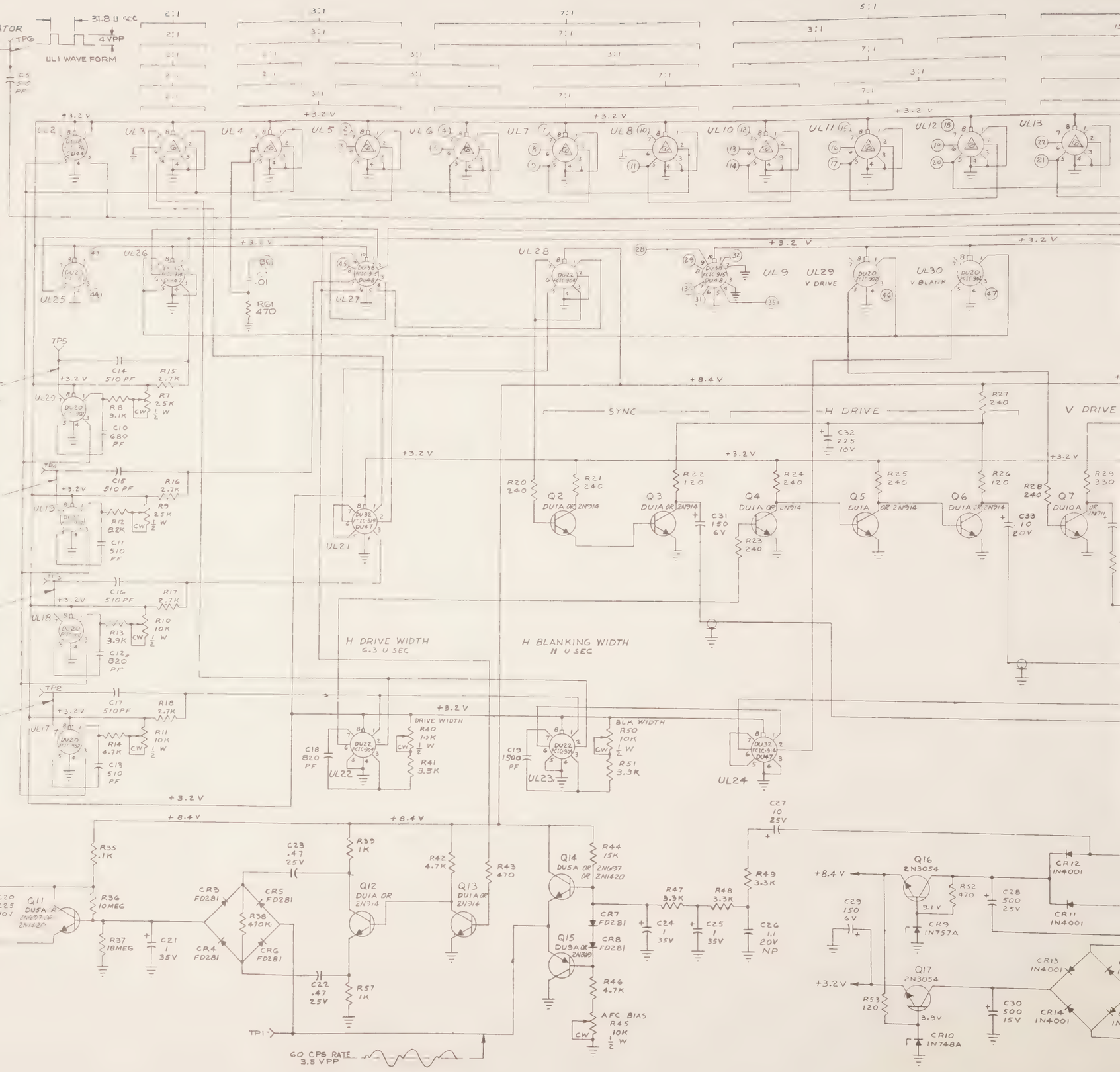
(NOTE 4 CONTINUED)
REMOVE JUMPER BETW. EFN "IC" P.#3 AND JUMPER BETWEEN SIB-2 #3. CONNECT SIC-3 TO R5 & R3 (CRYSTAL OSC). CONNECT SIC-3 TO R6 & R7 (CRYSTAL OSC).

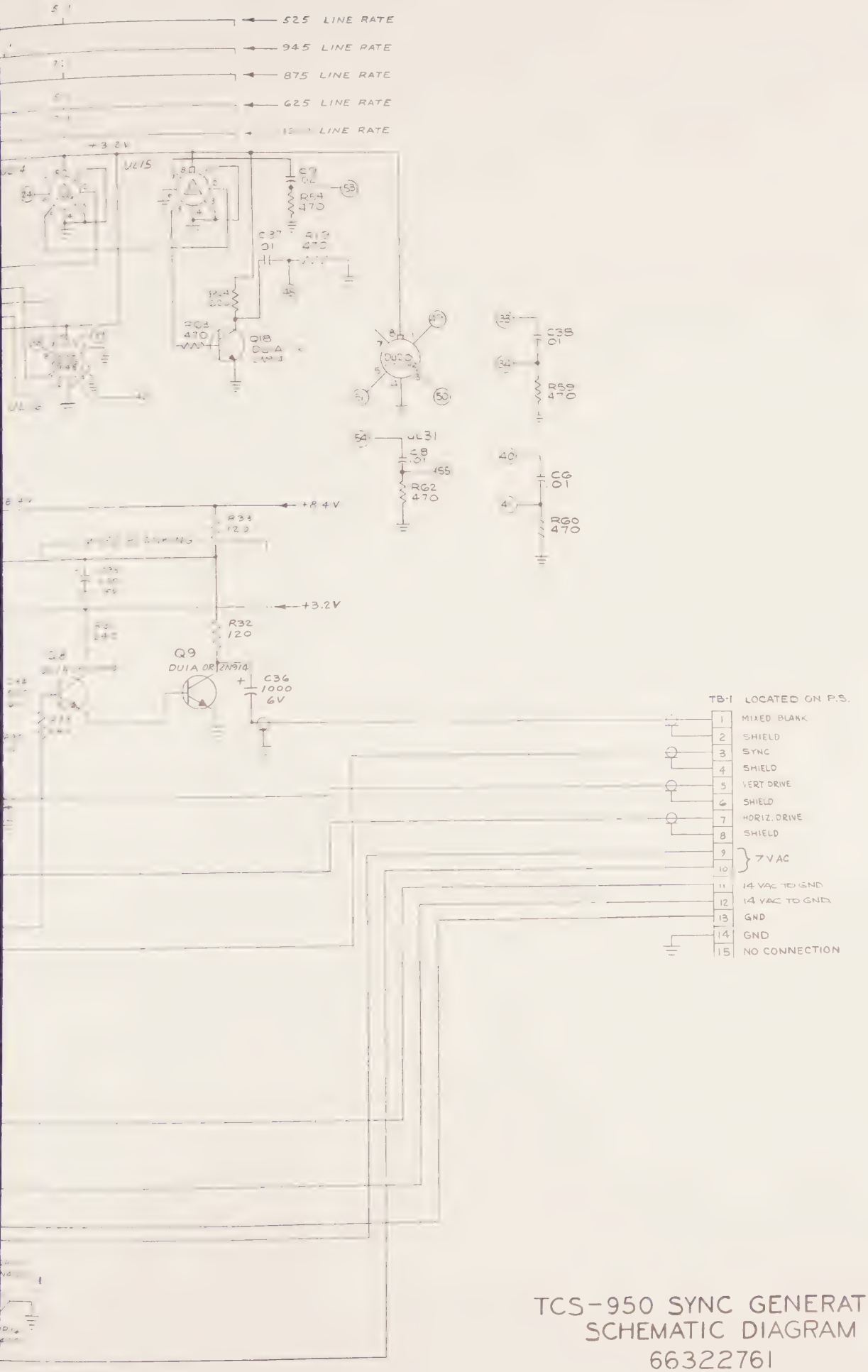
5. FOR JUMPER CONNECTIONS (⚠6) TO OBTAIN REQUIRED [illegible] SEE TABLE B.

JUMPER CONNECTIONS FOR LINE RATES		MASTER OR CRYSTAL OSCILLATOR FREQ (MC)
225 LINES		
2-36	E5-44	31.5 KC
3-GND	49-42-38	
5-34	29-11	
10-33	30-9	
8-GND	31-4	
18-32	28-43	
35-40	39-7-45	
41-13-16	17-47	
19-GND	14-46	
53-22-24	51-54	
48-50		
525 LINES		
36-42	48-44	31.5 KC
39-18	28-43	
4-33	29-10	
34-3	30-9	
5-GND	31-4	
2-36	28-43	
35-40	39-7-45	
41-13-16	17-47	
19-GND	14-46	
53-22-24	51-54	
48-50		
945 LINES		
36-42	53-28	52.5 KC
39-18	24-GND	
4-33	48-44	
34-3	28-43	
5-GND	39-7-45	
10-40	50-GND	
41-13	31-GND	
2-36	7-45	
35-40	9-29	
16-18	20-47	
19-GND	17-46	
1029 LINES		
2-36	48-50	61.74 KC
3-GND	55-44	
5-34	49-42-38	
10-33	29-11	
8-GND	30-9	
18-32	31-4	
35-40	28-43	
41-13	39-7-45	
16-GND	47-20	
19-GND	46-17	
53-22	51-54	
24-GND		

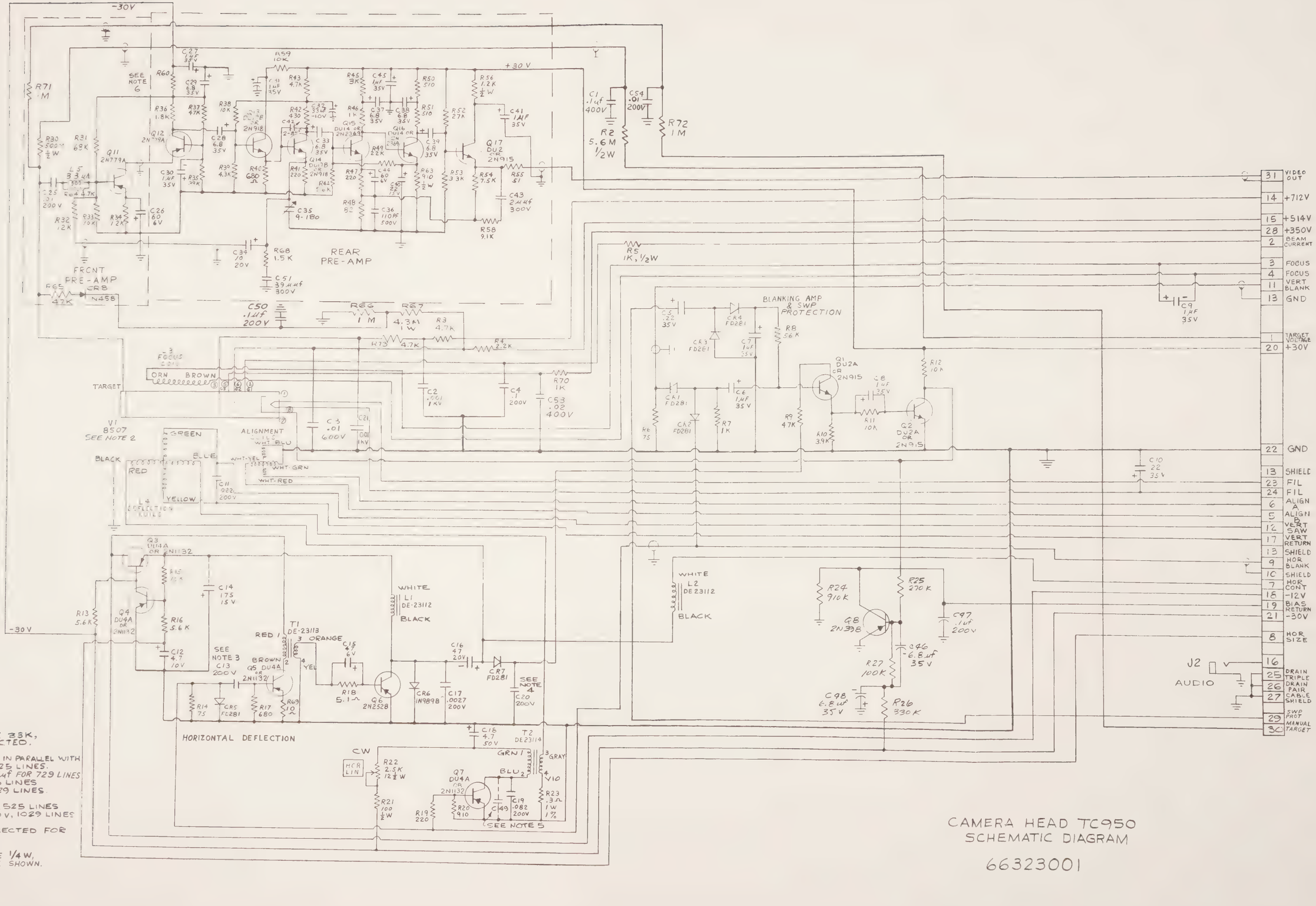
⚠6 FOR MICROLOGICS 3 TO 8 AND 10 TO 15 USE DU35, DU49, UX8992328X, OR FCIC-916.



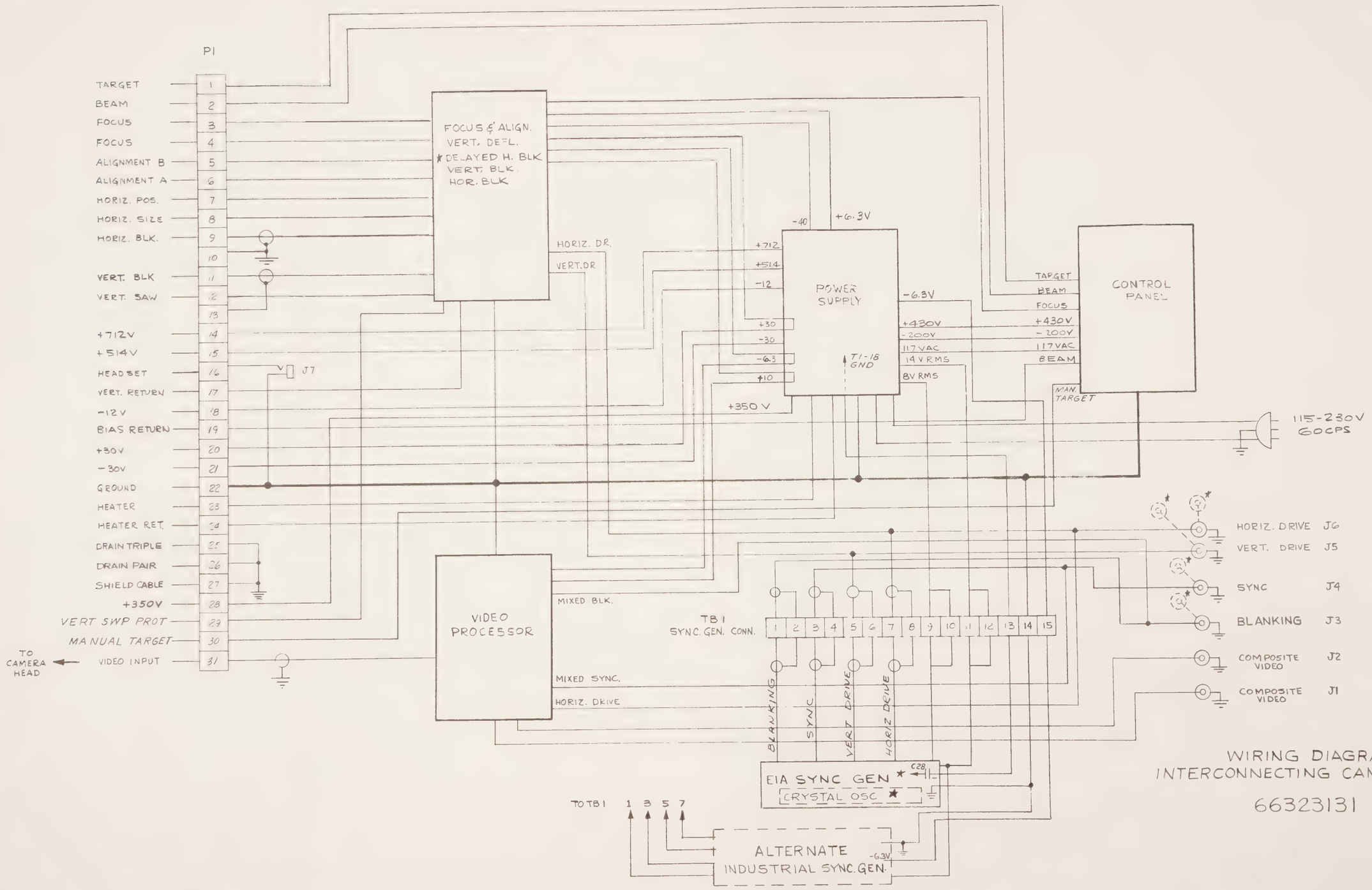




TCS-950 SYNC GENERATOR
SCHEMATIC DIAGRAM
66322761
(525 TO 1029 LINE RATE)


-30V
+30 V
REAR PRE-AMP
FRONT PRE-AMP
BLANKING AMP & SWP PROTECTION
HORIZONTAL DEFLECTION
CAMERA HEAD TC950
SCHEMATIC DIAGRAM
66323001
31 VIDEO OUT
14 +712V
15 +514V
28 +350V
2 BEAM CURRENT
3 FOCUS
4 FOCUS
11 VERT BLANK
13 GND
1 TARGET VOLTAGE
20 +30V
22 GND
13 SHIELD
23 FIL
24 FIL
6 ALIGN A
5 ALIGN B
12 VERT SAW
17 VERT RETURN
18 SHIELD
9 HOR BLANK
10 SHIELD
7 HOR CONT
15 -12V
19 BIAS RETURN
21 -30V
8 HOR SIZE
16
25 DRAIN TRIPLE
26 DRAIN PAIR
27 CABLE SHIELD
29 SWP PROT
30 MANUAL TARGET
J2
AUDIO
NOTES:
1- ALL RESISTORS ARE 1/4 W, UNLESS OTHERWISE SHOWN.
2. V1 SOCKET CONNECTED FOR 8507 VIDICON.
3. C13 - .1 uf, 200V, 525 LINES
C13 - .01 uf, 200V, 1029 LINES
4. C20 - .1 uf, 525 LINES
C20 - .01 uf, 1029 LINES.
5. ADD C49 - .1 uf IN PARALLEL WITH C19 (.082) FOR 525 LINES.
CHANGE C19 TO 0.05 uf FOR 729 LINES
6 NOMINAL VALUE 33K, FACTORY SELECTED.

★ OPTIONAL

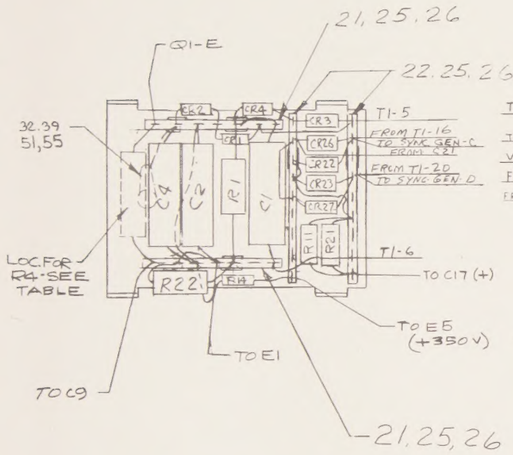


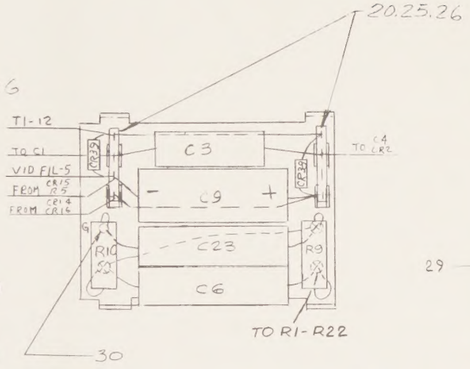
WIRING DIAGRAM
INTERCONNECTING CAMERA CONTROL

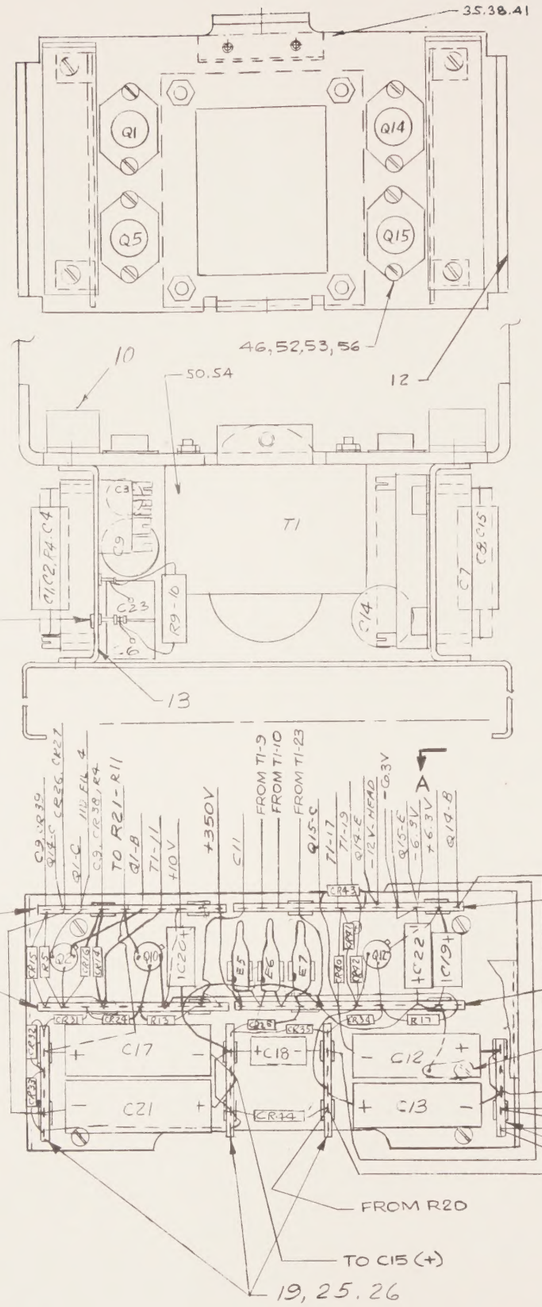
66323131

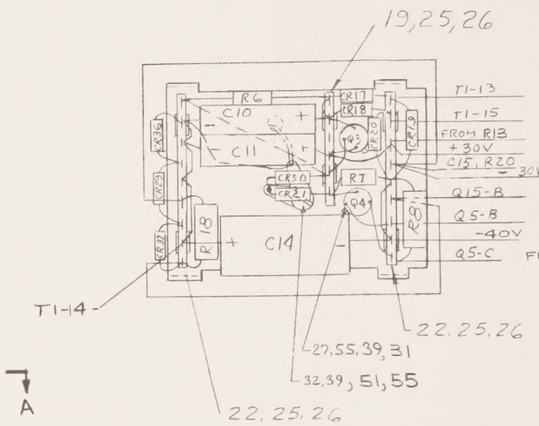
NOTES:

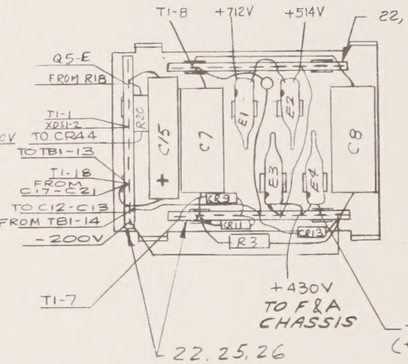
1. ITEMS NOT IDENTIFIED BY FIND NO. ARE IDENTIFIED BY REFERENCE DESIGNATION. SEE LM 8431131.



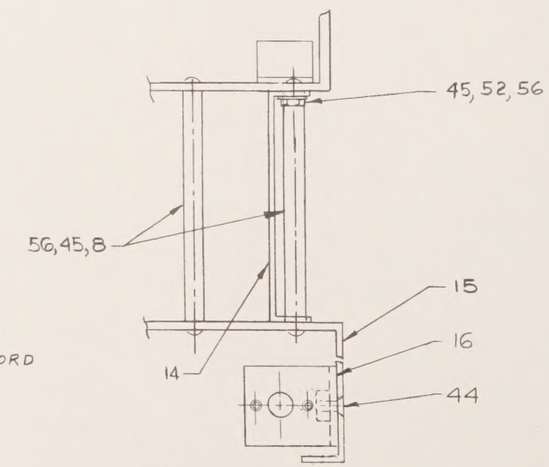








R4	TO BE USED WITH VIDICON
15Ω 3W 1%	8485
7.5Ω 5W 1%	7735-8507



VIEW A-A

POWER SUPPLY ASSEMBLY

84311131

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Fairchild Space and Defense Systems Division of the Fairchild Camera and Instrument Corporation (herein referred to as "Fairchild") warrants that each new Commercial Television Systems Product is free from defects in material or workmanship under normal use and service for a period of 90 days from the date of sale by an authorized Fairchild distributor to the first purchaser for use, except that tubes shall be deemed to be covered by the manufacturers' standard warranty applicable thereto, and are hereby excluded from the provisions of this warranty. If any such defect occurs during the warranty period the purchaser should immediately communicate with the authorized Fairchild distributor from whom the Product was purchased or, if the Product is being serviced by an authorized service organization other than the Fairchild distributor then such authorized service organization should be immediately notified of such defect. The defective part should be returned promptly through the Fairchild distributor to Fairchild's factory, transportation prepaid and if, upon examination by Fairchild, the part is determined to be defective in workmanship or material, Fairchild will, subject to the conditions and limitations below mentioned, either repair the defective part or replace it with a new part. Fairchild shall not be obligated to furnish any labor required in installing or servicing the Product including the removal therefrom of any defective part or the installation of a replacement part; nor shall Fairchild be liable for any delay or failure to furnish a replacement part resulting directly or indirectly from any governmental restriction, priority, or allocation or any other governmental regulartory order or action, nor shall Fairchild be liable for damages for reason of the failure of the Product to perform properly or for any consequential damages.

This warranty does not apply to any Product that has been subject to negligence, accident, misuse or improper operation, or that in any way has been tampered with, altered or repaired by any person other than an authorized Fairchild distributor or Fairchild authorized service organization or employee thereof, or to any Product whose serial number has been altered, defaced, or removed, or to any Product purchased within, and thereafter removed beyond, the continental limits of the United States.

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COMMERCIAL TELEVISION SYSTEMS
SPACE AND DEFENSE SYSTEMS DIVISION
FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

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